AVIATION WEEK

50 CENTS

03

SEP 19 1951

Goodyear CROSS-WIND Landing Wheels

Now Under Trial on C-54

NEWEST plane testing the Goodyear Cross-Wind Landing Wheels is the C-54 shown here—biggest airplane to operate with the revolutionary new gear that lets a plane land without reference to wind heading.

And among the newest smaller military aircraft, the T-6 Trainer under Air Force test is also equipped with Goodyear Cross-Wind Landing Wheels.

Private planes, commercial and military planes, all are finding that the Cross-Wind equipment brings new safety and dependability to piloted landings — as well as opening a new field for study in connection with fully automatic flight operations.

For further information on this and other Goodyear Aviation Products — tires, tubes, wheels, brakes, aircraft hose and Airfoam Super-Cushioning— write: Goodyear, Aviation Products Division, Akron 16, Ohio or Los Angeles 54, California.

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

equipped with Goodyear Cross-Wind Land-
Wheels continues heading into wind as
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Airfoam—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

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The Boeing B-47 Stratojet is the world's first bomber designed with swept-back wings for extreme speed, thus initiating a historic revolution in bombardment aircraft design.

ZENITH has answered the call to contribute its specialized experience in R.P.* parts, essential to the Air Force production program of this and other great ships, by a substantial expansion of the ZENITH plants.

These plants, designed exclusively for the production and fabrication of reinforced plastics, not only offer a complete and modern equipment installation, but the services of a research, experimental and engineering staff for the development and improvement of all parts produced by this method.

For quotations or cooperation, communicate directly with . . .

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LIFE is too short to determine the useful life of our ball bearings under normal conditions. That is why we *accelerate* tests, by overspeed, overload, extremes of temperature, by running, under every conceivable condition of operation, day and night, year after year.

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Forty years of this searching have given us a wealth of experience that should be helpful to you. No need for trial and error. We've been all through that, for your benefit.

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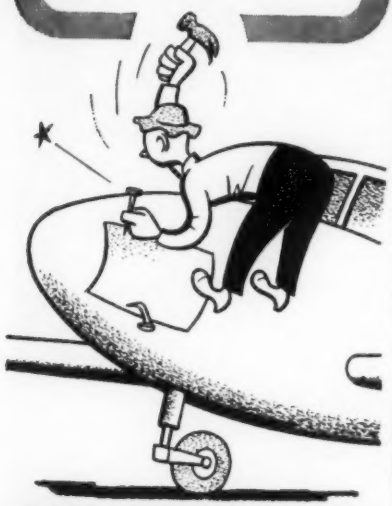
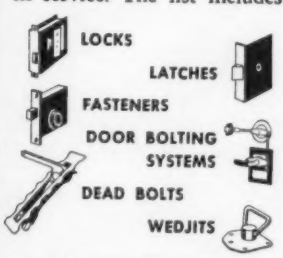
THIS HATCH NEEDS A LATCH BY ADAMS-RITE!



To keep everything on an airplane *shut*...and just as easy to open Adams-Rite has the *right* closure for you.

Adams-Rite manufactures over 600 separate closure devices which are specified and used on 4/5ths of all airplanes in service. The list includes:



In addition, Adams-Rite engineers are always available to design and produce any type of closure device to meet *your specific need.* We will take over the entire job from development to delivery—relieving you of every detail.

Send us your requirements. We will promptly submit our design proposal and quotation.

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Aviation Week

ABP Member ABC

Volume 55 — September 17, 1951 — Number 12

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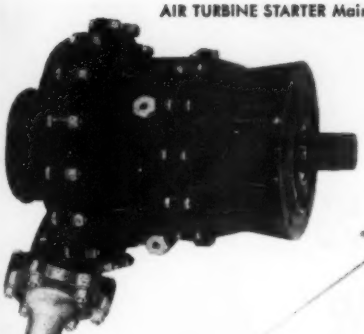
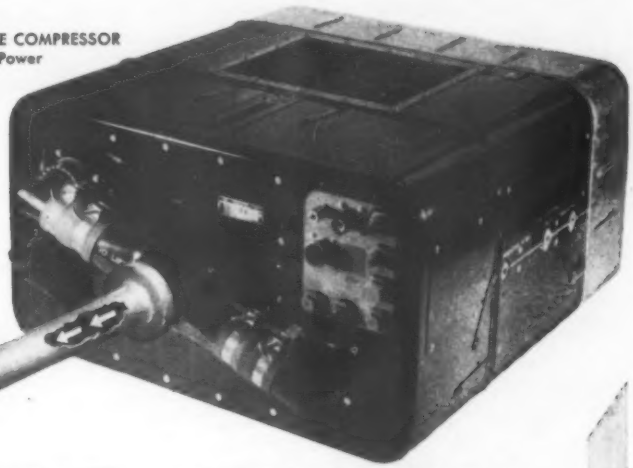
AIR TURBINE STARTER Main Engine Starting



GAS TURBINE COMPRESSOR
Source of Power



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In addition to turbojet, turboprop and rocket engines—modern aircraft demand efficient *auxiliary* power for self-starting, pressurization, heating, cooling, the operation of electrical systems, radar, radio, hydraulic accessories.

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Whatever your problem in the field of pneumatic power, you are invited to consult with AiResearch.

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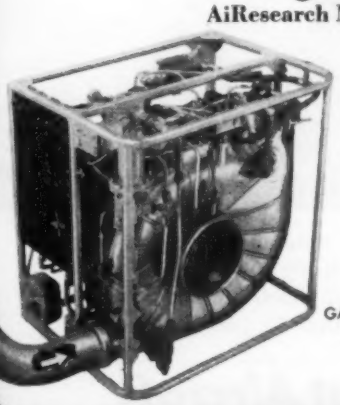

GAS TURBINE MOTOR
Operates Mechanical Accessories

REFRIGERATION TURBINE
For Cabin Cooling

Corsairs Fly 82% of Navy-Marine Support Sorties
Taking up where they left off in World War II, rugged, hard-hitting Corsair fighter-bomber planes built by Chance Vought Aircraft have accounted for 82 per cent
sorties flown by N
targets in K
l close air support
arine pilots against

VOUGHT CORSAIRS flew 13,120 of a total of 16,000 close air support sorties made in the first 11 months of the Korean War by Navy and Marine Corps pilots. This further underlines the soundness of design which still makes the F4U Corsair one of the world's finest fighter-bombers after 11 years of service.

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ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION

NEWS DIGEST

DOMESTIC

Capital Airlines has resumed contract negotiations with its pilots after a one-week recess. Both sides submitted new proposals in light of the Eastern Air Lines settlement on a mileage pay formula (AVIATION WEEK Sept. 10, p. 16).

Shipments of complete civil aircraft, measured in airframe weight, came to 435,700 lb. in June, being 216 planes valued at $8.1 million. Cumulative totals for January through June show an 18% decrease in number and an 11% decrease in value compared with shipments for the first six months of 1950.

Gerard B. Dobbin, legislative editor of American Aviation Publications and former executive secretary of the Aviation Writers Assn., died in Washington, D. C. Sept. 6. He was 49.

Douglas Long Beach strike by about 10,350 employes belonging to Local 148 (UAW), was still in force at press-time following vote of 172-46 to continue strike by welders, whose contract expired last Tuesday night. Welders union wanted pay hike of 10% plus ten cents per hour retroactive to October, 1950; Douglas offered 10% plus six cents an hour and balked at retroactive clause. Union shied from company proposal that its offer be coupled with a year's extension of expired contract.

Lockheed Aircraft has signed a contract with the Canadian government authorizing manufacture of the two-seat T-33 jet trainer in that country. The Canadian government has appointed Canadair Ltd., Montreal, as its agent to build the planes, and tooling is to begin immediately.

Clarence E. Faulk, Sr., 73, former president of Delta Air Lines died Aug. 31 in a hospital at Monroe, La. He was chairman of the board at the time of his death and one of Delta's largest stockholders.

Boeing Airplane Co. has filed a cross-complaint against Northwest Airlines in federal court in Seattle asking over $7 million for damages to business and reputation through publication of "false and defamatory" statements allegedly contained in NWA's suit filed last year claiming damage to business because of late delivery of Stratocruisers; for additional expenses incurred because it claims the airline failed to cooperate in the Stratocruiser contract; for additional services rendered; and for spare parts. The manufacturer has filed a demand for a jury trial.

Beech has delivered the first of the first five of a large number of twin engine D18s transports to the RCAF.

Brig. Gen. Horace A. Shepard has resigned from the USAF to become vice president of Thompson Products, Inc. Gen. Shepard was director of procurement and production engineering in the Office of Deputy Chief of Staff, Materiel, Washington.

FINANCIAL

The Flying Tiger Line has reported record earnings of $1,399,872 after taxes for the 1950-1951 fiscal year. Gross revenues of $15,582,059 were more than triple the volume of the previous year. The company's domestic and foreign freight operations produced revenues of $9,109,000, with other revenues coming from air contract and leases and outside maintenance for other carriers.

Elastic Stop Nut Corp. of America, Union, N. J. has declared a 25 cents dividend per share of common stock payable Nov. 1 to holders of record Oct. 15.

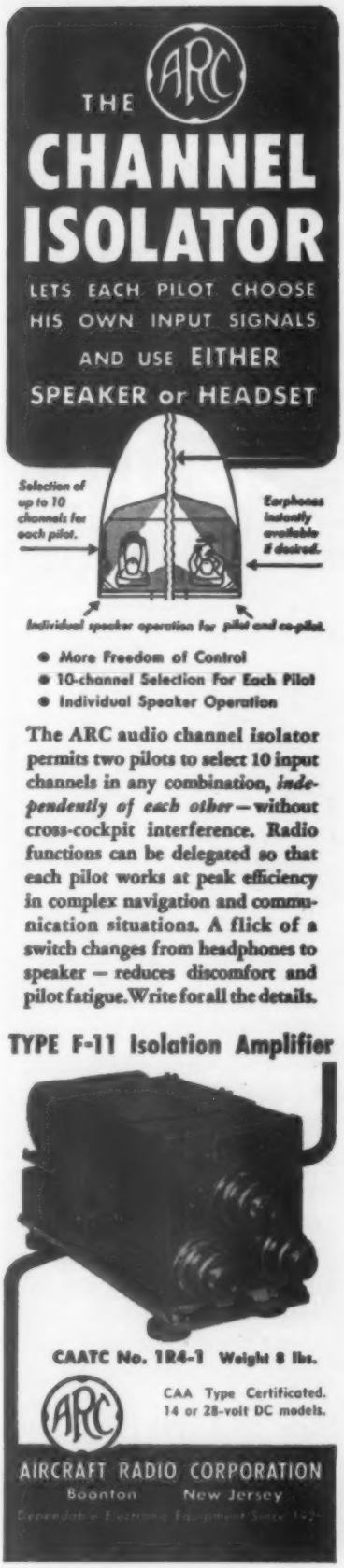
INTERNATIONAL

Dr. Kurt Knipfer has been named director of a new aviation division set up within the German Ministry of Transport. The Allied High Commission has invited the German government to organize this division to deal with civil aviation matters now administered by the commission's Civil Aviation Board.

Philippine Air Lines has ordered three Convair-Liner 340s for 1953 delivery. PAL also has two DC-6Bs on order.

First of eight VOR omnirange stations produced in Germany since the end of the war will be placed in operation near Stuttgart/Echterdingen Airport. The equipment is being built by C. Lorenz A.G. in Berlin with money furnished exclusively by the German government. Installation of all stations is expected to be completed by the end of April 1952.

Prototype Fouga CM. 101R made its first flight, of 50-min. duration, at Aire-sur-L-Adour, France on Aug. 23. The transport is designed to carry 14 passengers.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• More Freedom of Control
• 10-channel Selection For Each Pilot
• Individual Speaker Operation
The ARC audio channel isolator permits two pilots to select 10 input channels in any combination, independently of each other—without cross-cockpit interference. Radio functions can be delegated so that each pilot works at peak efficiency in complex navigation and communication situations. A flick of a switch changes from headphones to speaker — reduces discomfort and pilot fatigue. Write for all the details.
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AVIATION CALENDAR

Sept. 17-9—15th annual convention of the International Northwest Aviation Council, Jasper National Park, Alberta, Canada.

Sept. 18-20—Meeting of the meteorology committee of the Air Transport Assn., Greystone Lodge, Denver.

Sept. 20—Aviation Writers Assn., luncheon, with featured guest speakers. Wings Club, Hotel Biltmore, N. Y. C.

Sept. 26-28—Fall meeting of the American Society of Mechanical Engineers, Hotel Radisson, Minneapolis.

Sept. 27-29—Quarterly conference of executive board of Civil Air Patrol, Fairmont Hotel, San Francisco.

Oct. 2-4—Seventh annual aircraft spark plug and ignition conference sponsored by the Champion Spark Plug Co. of Toledo.

Oct. 3-6—Annual national aeronautical and engineering display and aircraft production forum, sponsored by Society of Automotive Engineers, Biltmore Hotel, Los Angeles.

Oct. 8-10—Sixth annual convention, National Defense Transportation Assn., Plaza Hotel, San Antonio, Tex.

Oct. 8-10—Special conference on aircraft electrical applications, sponsored by the Air transportation committee of the American Institute of Electrical Engineers and the Los Angeles section of the Institute, Hollywood Roosevelt Hotel, Hollywood.

Oct. 9—Air transport section, National Safety Council, Palmer House, Chicago.

Oct. 11-12—1951 conference on airport management and operation, University of Oklahoma, Norman, Okla.

Oct. 13-14—Air fair at Los Angeles International Airport.

Oct. 15-18—Society for Non-Destructive Testing, eleventh annual meeting, with symposium on jet engine part inspection, Hotel Detroiter, Detroit.

Oct. 16-17—Fourth annual New York State conference on airport development and operations, sponsored by the N. Y. State Dept. of Commerce, N. Y. Aviation Trades Assn., Assn. of Towns of the State, Conference of Mayors, County Officers' Assn. and the N. Y. State Flying Farmers, Onondaga Hotel, Syracuse, N. Y.

Oct. 29-30—Air Industry & Transport Assn. of Canada annual general meeting, Seigniory Club, Montebello, Quebec.

Oct. 29-31—National transportation meeting of Society of Automotive Engineers, Hotel Knickerbocker, Chicago.

Oct. 24-25—1951 annual convention of the National Assn. of State Aviation Officials, Arizon Inn, Tucson, Ariz.

Oct. 31-Nov. 1—Society of Automatic Engineers, fuels and lubricants meeting, Drake Hotel, Chicago.

Nov. 7—Annual Wings Club Dinner, Waldorf-Astoria, New York.

PICTURE CREDITS

9—(P. 1067) Wide World; (B-36D) USAF; (Yak-18s) Sovfoto; (F7U-1) INP; 13—Republic; 14-15—McGraw-Hill World News; 16—Beech Aircraft; 20—(top) McGraw-Hill World News; (center) Consolidated Vultee; (bottom) Keystone; 22—(top) Douglas Aircraft; (bottom) McGraw-Hill World News; 44—Eastern Air Lines.

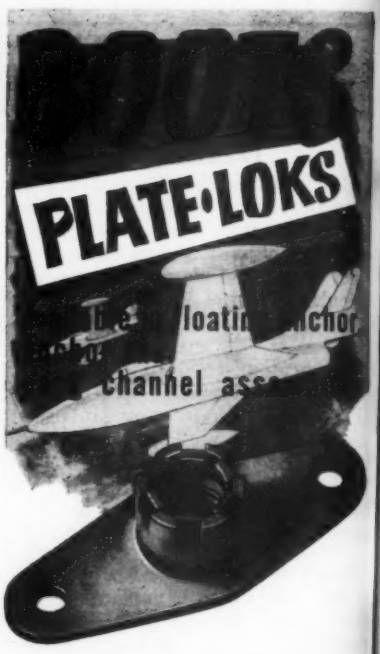

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Plate-Loks in anchor bases to meet your every requirement—plain anchors, one-lug, corner, midget, right angle. The all metal Plate-Lok is fully approved under AN-N-5 and AN-N-10. Its positive locking action is proof against vibration and structural breakdown due to radical temperature changes.

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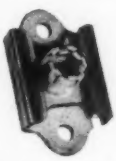
The unique Plate-Lok Nut assembled into straight channels; removable or permanently attached nuts. Standard-length channels in a wide range of nut spacings are available; special lengths and spacings can be supplied to your order.



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Now in one-lug, two-lug, and right-angle bases — for regular or countersunk rivets, for welding — permanently assembled or with removable nuts. For anchor applications where float is desirable — specify Plate-Lok!

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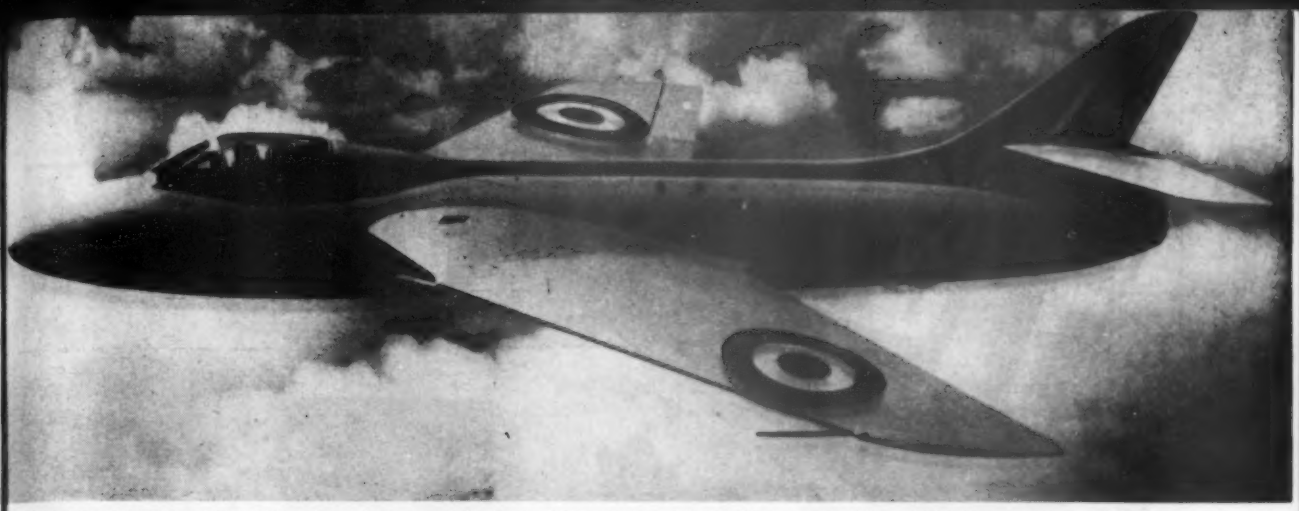


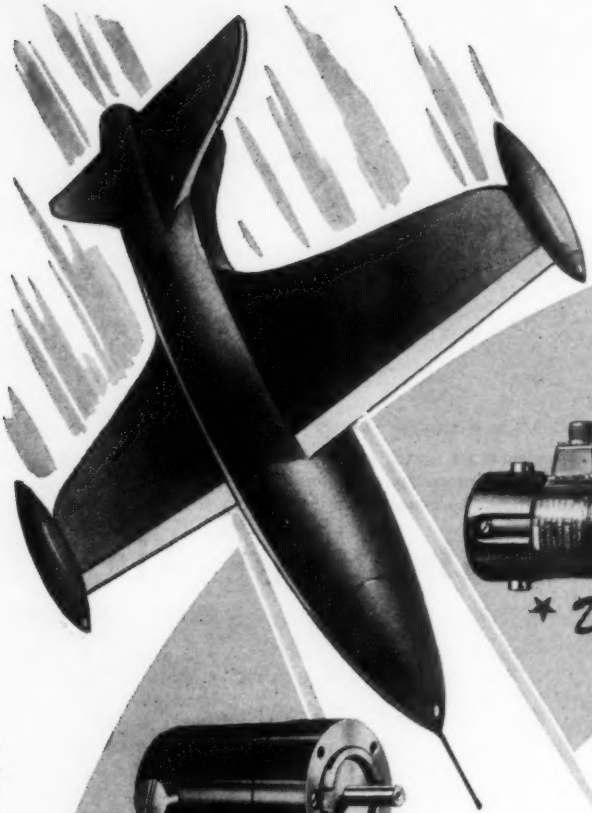
HAWKER'S LATEST—First flight view of the new Hawker P.1067 single-seat jet fighter, powered by a Rolls-Royce Avon, which has been ordered in quantity by the RAF. The 650-mph.-plus interceptor features sweep on all surfaces. The pilot enjoys fine visibility. At SBAC display, Farnborough (See p. 14), P.1067 tore past spectators at speed claimed to set unofficial world mark.

Military Developments in the Air

SAC TOURIST—A ten-engine Convair B-36D giant intercontinental bomber is caught at an unusual angle as it comes in at "a tropical Air Force base." Close study of the original print shows some skin wrinkling on the fuselage just aft of the huge wing.

TTLE RED "SCHOOLHOUSE"—Yak-18 trainers being flown "young flyers of the Chkalov Central Air Club of the USSR."

CUTLASS CATAPAULTED—A Patuxent-based Vought F7U-1 Cutlass is boosted off the USS Midway during sea evaluation trials.



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WHO'S WHERE

In the Front Office

Seth R. Thompson has been appointed assistant to the president of Kaman Aircraft. In his new position, Thompson, who was formerly staff engineer, will determine methods for improving efficiency between the firm's various departments.

A. D. Engle has been named assistant vice president-research for The Austin Co., engineers and builders, and will be responsible for special assignments including foreign work. Engle joined Austin in 1920 and has worked in a number of outstanding aircraft plants.

James A. Wooten has been elected president and a director of U. S. Airlines, in a sweeping change in company management. He had been president of Alaska Airlines, Near East Airlines, and general manager of American Airlines' contract air cargo division. Other new directors elected to the board of the scheduled all-freight carrier: **Charles B. Ripley, Herbert Chernin, Adam G. Thompson** (also elected vice president-operations), **and Joseph E. Griffin** (also elected treasurer). **Louis L. Berg** was elected vice president-sales.

Changes

C. L. Van Derau has been named general works manager of both the Mansfield and Columbus, Ohio, plants of Westinghouse Electric Appliance division. Other staff changes announced for the new $20-million Columbus jet engine facility, expected to be completed early in 1953 are: **E. L. Smith** will be works manager; **C. D. Heaton** will be manager of manufacturing; and **John B. Roman** will be works engineer. To fill vacancies at the Mansfield installation, **P. J. Beckman** is promoted to works manager; **Dean B. Fighter** moves up to manager of manufacturing and **Christ Reining** is advanced to works engineer.

B. M. (Barney) Laney has joined Kaiser-Frazer at Willow Run to work as aircraft consultant on the C-119 Packet production program.

T. F. Riddle has been named assistant plant manager of the Fairchild Aircraft division's Chicago plant. **Joseph H. Baylis** has been designated director of industrial relations for the Fairchild Aircraft division.

B. R. Teree has returned to the Weatherhead Co. as chief engineer in the Aviation division.

Gilbert I. Clark has been appointed project engineer of the American Cladmetals Co., Carnegie, Pa.

Ralph T. Rabe has been made manager of the new Atlanta, Ga., district office for the Automotive, Aviation and Government Sales division of B. F. Goodrich Co.

Gilbert F. Quinby has been designated sales manager of National Aeronautical Corp., Ambler, Pa.

George T. Keller has joined Southwest Airmotive Co., Love Field, Dallas, as contract coordinator.

Ilia I. Islamoff has joined the Ludwig Honold Mfg. Co., Folcroft, Pa., aircraft sheet metal fabricators, as general manager.

INDUSTRY OBSERVER

► The long-simmering Navy deal for General Motors to build Grumman F9Fs in Texas is getting hot again. A Detroit paper carried the first story of negotiations last March, but it never got confirmation. Only recently however, General Motors announced acquisition of a 255-acre site at Arlington, between Ft. Worth and Dallas. Texas reports say that politically potent Ft. Worth publisher Amon Carter is putting heavy pressure behind the deal to get the General Motors organization into his area.

► Boeing's B-52 eight-jet bomber program is getting far along in production planning now. Subcontracting parts to other manufacturers is under discussion at AMC headquarters, Wright-Patterson AFB. Kaiser-Frazer will probably be one of the first subcontractors in the super-bomber program.

► Although aircraft manufacturers are still adjusting wage scales to conform with the minimum wage regulations issued last year by Secretary of Labor Tobin, report is that they will probably have to begin the task all over again. Officials in Labor Department state they are under pressure from United Auto Workers to reopen the aircraft minimum wage schedules.

► Considerable speculation is circulating in Washington aviation circles that Japan might be the world's first nation to carry all air mail by helicopter. Representative of the Japanese government has just completed a detailed study of U. S. mail operations and helicopter designs with the specific aim of making recommendations to the new independent Japanese government. He has told government officials that fixed-wing carriage of mail had not been completely successful in Japan due to the short distances between large population centers.

► New twin-engine carrier-based bomber A3D under development by Douglas Aircraft for Bureau of Aeronautics probably represents the ultimate in large plane types suitable for carrier operation. The big plane will weigh about 70,000 lb. It will be in production about the time that Navy's super-carrier Forrestal enters fleet service,

► Naval aircraft strength, currently pegged at about 8,700 planes, will increase to about 10,000 at year-end 1953, informed Naval sources say. Production emphasis will be aimed at enlarging air carrier groups and anti-submarine squadrons.

► While the Convair flying boat R3Y represents just about the largest of its type contemplated by Navy, Air Force is just completing study of engineering proposals for land transports with still larger cargo capabilities than the giant Convair XC-99 for very heavy combat logistic transport. All proposals which are being considered contemplate turboprop engine installations.

► Air Force will procure both the Chase C-123 and Douglas C-47F transports to meet requirements set forth by Strategic Air Command for very long range air evacuation mission. As interim measure, Air Force will ask Douglas to modernize some of its obsolescent C-47 equipment to F series. But as Chase goes into production at Willow Run, some production will be channeled to meet the SAC requirement. The C-123 placed first in the recently held Eglin AFB, evaluation among a Fairchild C-119, Grumman SA-16, Douglas Super DC-3 and the Chase entry.

► Standardization of the new 20-mm aircraft cannon firing an electric-primed shell, and standardization on a new "family" of four bombs for aerial drop, has obsoleted much World War II ammunition, according to USAF testimony before Congress. The new bomb family includes 5-ton high performance bomb; 3,000-lb. high performance bomb; 750-lb. general purpose bomb; and 1,000-lb. low-drag bomb to be carried externally by fast jet fighter-bombers. Canada and Great Britain have agreed on use of the new bomb types.

Washington Roundup

No Defense Cutting in Congress

Economizing on the defense build-up, here and abroad, isn't going to come from Congress. Funds for chauffeurs and other "trimmings" will be pared out on Capitol Hill. But congressmen and senators, it was clear by last week, aren't now in a temper to meddle with the main pegs of the build-up.

• The Senate readily added $5 billion for air power—a last-minute request by Defense Department—onto the $60-billion 1952 fiscal year military budget that was approved by the House virtually intact. In fact, the Defense request came through only after repeated nudgings of department chiefs by Senate Appropriations committeemen.

• The only try at a major slash in the European build-up program flopped. The Senate, 43 to 23, voted down a proposal to reduce by $250 million the $5 billion planned for military aid this fiscal year—although economic aid was sharply cut. Early this year there was strong opposition to sending six divisions to Europe and committing our forces to a "ground war" to hold the continent. But opposition fizzled. The House passed funds for military assistance to non-Communist nations without a penny's cut.

Plane Production Time-Table

The key reason behind Defense Department's request for $5 billion additional for air power: Unless more money is made available for contract letting now, aircraft deliveries will sharply decline after mid-1953, and plants will face shutdowns.

This is the schedule on the air power build-up:

• Expansion of the industrial base will be completed by January, 1953. The pressure for two- and three-shift operations will be off.

• The peak in aircraft deliveries will be reached by mid-1953 and then level off—provided contracts contemplated in the $5-billion additional request are let over the next six months. If they are not, there will be a drop, instead of a leveling off, of deliveries after mid-1953.

Meanwhile, USAF's Secretary Thomas Finletter reported on the output rate:

• Deliveries are now running about 11% behind schedule and will for the next five months.

• This slippage will be made up by next mid-year.

• By the end of 1952, deliveries will be running 33% ahead of schedule.

Air Mail Postage Boost?

It's a toss-up whether Congress will boost the domestic air postage rate before adjourning in a few weeks.

The Senate has voted an increase from six cents an ounce to eight cents. It rejected, by a substantial 49-to-18 vote, a move by Sen. Edwin Johnson to strike out the increase. Johnson argued that the postage increase would reduce volume and, instead of giving the Post Office an increase in revenue, would result in decreased revenue from air mail.

Another point against the increase, raised by Sen. Lester Hunt: The decrease in air mail volume will increase the reliance of small local carriers on subsidy and might cause some of them to go out of business.

The postage rate increase bill approved by the House Post Office and Civil Service Committee, though, does not hike the air mail rate. The measure is scheduled for House action this week. There is strong sentiment on the House side against going along with the Senate-voted air mail postage boost until it is studied in hearings.

Breaking the Law

The law reads that the strength of the Air Force "shall not exceed 70 groups."

But strength now stands at 87 wings (groups plus supporting units).

And although Congress has gotten around to complying with Defense Department's request to repeal the "not to exceed 70 groups" provision, one of its committees, Senate Appropriations, has directed that a 95-wing force be "the floor" on air strength.

Experienced Hand

A familiar hand was directed to the problems of air power in the nation's defense when Robert A. Lovett was nominated last week by President Truman to succeed Gen. George C. Marshall as Secretary of Defense. Before he became Deputy Secretary of Defense, Lovett had been Assistant Secretary of War for Air and Undersecretary of State. He had been carrying an increasing share of the load in recent months for Marshall.

PR Personnel Cutback

Prospect is that public information activities of all three services will be sharply cut and to the same level.

The Senate reduced funds for the purpose; the House is likely to go along.

The Senate allowed $9.7 million for public relations activities this year, to be divided equally among the three services. They had $12.2 million last year, wanted $15.4 million this year. USAF had asked for $6 million; Army, $4.8 million; and Navy, $4.5 million.

Burning $5,400 in 30 Seconds

Rato propellants for a single B-47 takeoff cost $5,400, USAF reports to Senate Appropriations Committee. Required are 18 units costing $300 apiece. They burn for 30 seconds.

Sen. Joseph O'Mahoney commented: "The further we go into this scientific stratosphere, the more expensive it becomes."

Things to Watch For

• **New Navy carrier.** Watch for Navy to make a bid for a twin to the 57,000-ton Forrestal in about six months.

Navy's new Secretary Dan Kimball quickly corrected the report that the Navy didn't want another carrier until Forrestal had been built. Navy wants to put off construction of another carrier, he clarified, until it knows all the operational details of the Forrestal. But these will be known in "six to eight months," he added.

• **Railroad control.** Watch for a new drive by the rails to control airlines when Senate Interstate and Foreign Commerce committee opens hearings on legislation rewriting the 1950 Transportation Act early in January.

—Katherine Johnsen

AVIATION WEEK VOL. 55, NO. 12 SEPTEMBER 17, 1951

Senate Pushes Build-up for Air Power

Two-thirds of $5-billion emergency fund would go to AF, one-third to Naval air.

With funds apparently assured to lay the groundwork for a build-up to a 150-wing Air Force and a Naval striking air arm of 20 carrier groups, first service steps toward these goals will probably begin soon.

The Senate last week approved a $5-billion "National Emergency Fund" for the purpose. House approval seemed certain. It is backed by Department of Defense.

▶**Air Strength Status**—USAF's strength now stands at 87 wings; Naval aviation's strength at 14 carrier groups. The $60-billion military budget for the current 1952 fiscal year is geared to achieving a 95-wing USAF and a continued Naval air strength of 14 carrier groups.

The fund would be appropriated to the Secretary of Defense for allocation to the Air Force and Naval aviation. But the Secretary would have to give the House and Senate Armed Services and Appropriations Committees ten days notice on any contemplated allocation, permitting congressional review and recommendations. Use of the fund for Army aviation is explicitly barred.

▶**Fund Purpose**—This is the two-fold purpose of the fund:

• To assure a continued strengthening of air power. The $60-billion budget falls 2,000 planes short of providing for an up-to-date 95-wing force after December, 1952, and 1,203 planes short of providing for modern aircraft for a 14-carrier-group Navy in 1953, Defense chiefs say. Unless these planes are ordered now, it means that, by 1953, a 95-wing USAF and 14-carrier-group Navy would be equipped with obsolete and obsolescent planes. To preclude this back-sliding in air power, defense chiefs emphasized, contracts must be let now. Lead time of 18 to 24 months is required to get aircraft into service.

• To "broaden the base," as Defense Deputy Secretary Robert Lovett put it, for a future build-up of air power beyond the 95-wing USAF and 14-carrier-group Navy. The $5 billion—two thirds of which is expected to go to USAF, and the remaining one-third to Naval air—will be used, not only for aircraft contracts, but also for facilities of various types. Only a small amount, if any, of the $5 billion will go toward expanding industrial capacity. This, because the $2.7 billion that has already been made available to USAF and Naval air will provide an industrial base sufficient for even an all-out mobilization program.

Whether or not USAF's build up to 150 wings and Navy's build-up to 20 carrier groups moves forward—and how fast—is still at issue.

▶**No Commitment**—The $5-billion fund to lay the groundwork, it was emphasized by both Lovett and members of Senate Appropriations Committee, is not a build-up "commitment".

Lovett explained:

"It would form the first step in a substantial increase, without agreement as to the precise number of wings at this stage.

"The next couple of years will be capital investments that must be made as wisely as possible, weighing the factor of the obsolescence of equipment and there must be a substantial amount of flexibility.

"Whether the ultimate strength of the Air Force is 100 groups or 150 or more groups, the assets would be utilized."

▶**Key Decisions Due**—Key decisions on the USAF and Naval air build-up will be made by the Joint Chiefs of Staff, the Secretary of Defense, and the President by Oct. 1.

Final Administration decision on the "end forces" for the three services by July, 1953, is due on that date. After this decision is made, the services will calculate the budgets they will require for the '53 fiscal year.

▶**Prospect**—Here is the outlook:

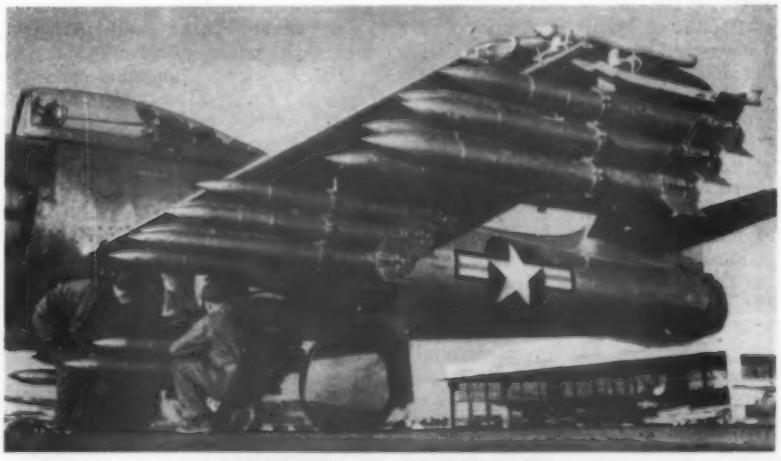
• The President, following the recommendation of the Joint Chiefs of Staff, will approve a USAF build-up during the '53 fiscal year to 110 to 120 wings and a build-up of Naval aviation over this period to 16 or 17 carrier groups.

• But the Administration will not make a commitment to future build-up beyond these goals, putting this off for evaluation when the 1954 fiscal year military program must be decided upon a year from now.

▶**Top Money to USAF**—A $3-billion allocation from the $5-billion fund will boost USAF's '52 fiscal year appropriation to $23 billion—substantially topping Army's budget, $20 billion, for the first time in history.

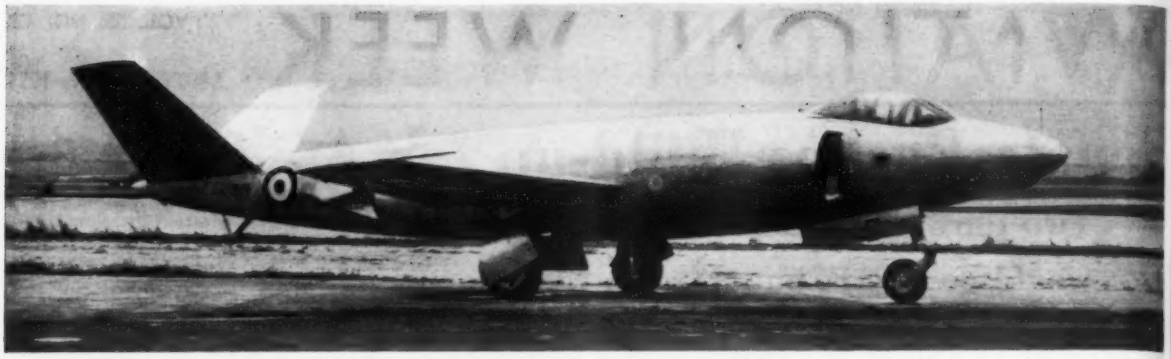
Earlier in the year, USAF "roughly" estimated it would need a $24.1-billion '52 appropriation to launch a 150-wing program. A slightly bigger allocation from the $5 billion would bring it up to this level.

On later year requirements for the build-up, USAF estimated: $29 billion to build up to 120 wings during the '53 fiscal year; and $34.6 billion to build up to 150 wings during the '54 fiscal year. The level-off annual cost for maintaining 150-wing strength: $25 billion.



THUNDERJET ROCKETEER

This closeup of a Republic F-84E Thunderjet fighter-bomber shows the craft fitted with an awesome load of 5-in. high velocity aircraft rockets for use against ground targets, also demonstrates the plane's load-carrying ability.



SUPERMARINE 508 features a Vee tail, is said to be the fastest and most powerful fighter ever designed for naval operations, which may well be a valid claim since it is powered by two Rolls-Royce Avon turbojets. Main wheels of tricycle landing gear retract.

New Developments Seen at SBAC Display

AVIATION WEEK's *on-the-spot observer at the 12th annual SBAC display at Farnborough, England, last week was staff writer David A. Anderton. The show opened Tuesday, Sept. 11. Here is his first report:*

By David A. Anderton

Farnborough, England—The pale green Hawker P.1067 hurtled past the stands at the twelfth Society of British Aircraft Constructors flying display today in a burst of speed claimed to be in excess of the world's speed record. Flown by Squadron Leader Neville Duke, the sweptwing Hawker craft put on the outstanding performance of this annual display.

Just before Duke turned into his high-speed run it was announced that he was going to try to beat the world speed mark unofficially and that he had previously made routine flypasts in excess of the mark. When he blasted past the watching technicians and journalists he was traveling faster than any airplane I have ever seen fly—and that includes our F-86 Sabre. The P.1067 was ordered "off the drawing board" as a production fighter for the RAF.

▶ **World's Fastest**—In speaking of the plane, Mr. Arthur Henderson, the Minister for Air, called it the fastest fighting aircraft in the world, capable of outmatching both the F-86 and Mig-15.

Ranked one step below the astounding performance of the Hawker jet was the amazing slow-speed flight demonstration of Avro's 707B delta-winged aircraft flown by Wing Commander Roland Falk. The 707B made its first flypast clean and fast. On the second circuit, Falk brought the little blue triangle in low and slow at a speed probably in the neighborhood of 150 mph. On his third pass Falk demonstrated the exceptionally high rate of roll of the delta-winged craft.

▶ **Supermarine 508**—A third highlight occurred about half an hour after the conclusion of the flight display. The Vickers-Supermarine 508 twin-Avon straight-winged naval fighter landed after a high-speed pass and two slow circuits. It had been scheduled, but had failed to show, earlier in the day. The arrival of the 508 followed on the heels of an unscheduled flight of the Sapphire-Canberra, a flying test bed version of the now-famous light bomber, originally scheduled for flight during one of the circus formations.

A circus consists of consecutive take-offs, flypasts and landings. The Sapphire-Canberra had lost thrust on one engine near the midpoint of its takeoff run. The plane swerved sharply toward the crowd for one awful instant and then almost immediately was turned away and kept on the runway by quick pilot action.

▶ **Flight Program**—The flight program was divided into five parts—two circus formations, helicopter demonstrations, light aircraft flights, and individual flight performance displays.

There were disappointments—the Vickers Valiant, a beautiful craft with very clean lines, cruised over the crowd at an obviously low throttle setting showing none of the potentialities attributed to it; the Nomad-Lincoln, a fire-engined flying test bed conversion of the Avro Lincoln bomber also failed to live up to its advance notice on the flyby.

It was expected that the Lincoln would have all four Rolls-Royce Merlin engines shut down and that it would be flying on the Nomad—a composite diesel engine and gas turbine—but as the great craft roared by all five engines were turning over, with the Nomad seeming to be running only a few revs above idling speed.

The Vickers-Supermarine Swift, which shares the RAF's production program with the Hawker P.1067 had been belly-landed some days ago and was unavailable for flight or static display. In its place was flown the V-S type 535, the forerunner of the Swift. Although it was last year's hair-raiser, the 535 seemed rather slow in comparison to the P.1067 this year.

The Fairey FD.1 delta-winged job failed to show, as did the twin-rotor Bristol 173 helicopter. The Westland Wyvern naval strike aircraft and Fairey Firefly 7, both programmed for flight, failed to get into the air. The Mamba-Marathon, with reverse-pitch propellers fitted for the first time to a gas turbine engine, experienced some powerplant difficulties and had to be scratched.

Most of these were temporary casualties on this preview dress rehearsal day and the general feeling was that almost all the craft mentioned would fly during the rest of the six-day exhibition.

▶ **Pilot Skill**—As always, pilot skill gave the crowd many of its best moments. Squadron Leader Janusz Zurakowski climbed the Meteor ground attack version vertically until he ran out of thrust and let the heavily loaded plane fall over the top and into a tight fast spin. Pullout came after several turns, to be followed by two more sets of spins and recoveries. In 1950 Zurakowski made the flights with the Avon Meteor, turning the fuel on and off several times deliberately during the demonstrations.

Squadron Leader John Derry contributed his consummate aerobatic skill to low-level circuits of the de Havilland Sea Venom making leisurely circles over the runways "as if he were on rails," as the announcer put it.

The biggest disappointment was the flight demonstration of the short SA4 four-Avon jet bomber, supposedly in a class with the Vickers Valiant.

The brightest hope was that the rest of the craft would be in the air for the rest of the show.

Lockheed Backlog Passes $1 Billion

Lockheed Aircraft Corp., Burbank, Calif., now has a backlog of over one and one-quarter billion dollars. According to an interim report issued by the corporation, unfilled orders and letters of intent total $1,245,600,000.

During the first half of this year, President Robert E. Gross revealed, Lockheed's sales came to $98,054,000, compared with $84,479,117 for the same period last year. Total mid-year income for the current period, including income from subsidiaries, was $101,339,650 as against $84,922,968 for the first half of 1950.

"Heavy expenses characteristic of a make ready period . . . cut profits somewhat compared with the previous year, although sales were up 16 percent," declared Gross.

Firm contracts are split up as follows: 58.7% USAF, 30.4% Navy, and 10.9% commercial. Orders for 68 Constellations brought the company's civil backlog up over $100 million, highest in Lockheed's history. Most recent orders are from Trans-Canada for five and Quantas Empire Airways for one Super Connie.

Highlights of the company's present production schedule include output of F-94B and F-94C two-seat all-weather fighters, start of tooling for the single-seat F-94D, rising output of T-33 and TO-2 jet trainers to the highest level of any plane since World War II, production of large quantities of P2V-5 Neptune patrol bombers for the U. S. Navy, Great Britain and Australia, getting ready to turn out B-47 Stratojet bombers under license at Marietta, Ga., and thre new models under development, including the XC-130 turboprop cargo transport for the Air Force.

Services to Buy 800 Helicopters

The helicopter, which has effectively proved its military and rescue usefulness in Korea will be a key vehicle in U. S. military operations from here on.

This year the services launch their first major helicopter procurement program. They will spend over $200 million to purchase some 800 rotorcraft.

▶**Only Begun**—But the helicopter's day is only dawning. Marine Corps' Director of Aviation, Brig. Gen. Clayton C. Jerome, reported to a Senate committee:

"The helicopter is just developing. Any similarity between it and the helicopter of ten years from now will be purely coincidental. The next step we have to go to is the convertiplane which takes off as a helicopter, lands as a helicopter, and in the air goes forward at high speed. That is what we are building up to. I think it is absolutely possible within the next ten years. We have got to get it started now."

Other helicopter points by Jerome and Rear Adm. Herbert Duckworth:

• No successful defense has yet been developed against the helicopter. Fighters are too fast to take a good aim, and, in addition, the helicopter is "a poor pay target." The helicopter is difficult to bring down with artillery. Jerome's estimate: Another helicopter is the only prospect for successful anti-helicopter warfare.

• Navy plans two helicopter anti-sub squadrons, one for each fleet, and looks forward to using the helicopter as a bomber. Duckworth reported: "We are looking forward to using the helicopter, not only to locate and hold contact with the target, but also to attack from the helicopter. The probability of kills will then go up tremendously."

These are details on the services' helicopter programs for the current 1952 fiscal year, as reported to Senate Appropriations Committee:

Navy will spend $160 million for 500 craft for Naval and Marine Corps activities. These will include the following types, with the cost per unit in parenthesis: Hiller trainers ($57,420); Kaman observation craft ($453,000): Bell anti-sub craft ($486,650); Bell trainers ($50,750); Piasecki HUP-2 utility craft ($342,000); Sikorsky HRS-2s for cargo transport ($255,915). Out of the Navy's 500 purchases, 127 will be HRS-2s and 100 anti-sub craft.

Army will spend $40 million to procure 290 helicopters. The bulk of these —over 200—will be light utility craft H-13s and H-23s costing approximately $50,000 each. In addition, the Army will procure: 52 H-21s for cargo and air assault operations at $439,400 each; and 25 H-19s at $200,000 each.

Air Force will buy 18 H-21s at $730,000 each. The higher cost of the USAF craft is due to the fact that the price includes electronics, communications, and other equipment.

Meeting to Study Ignition Problems

A host of aircraft ignition problems will be studied by the country's leading airline engineers and maintenance exports at Champion Spark Plug's Aircraft Spark Plug and Ignition Conference to be held Oct. 2, 3 and 4 at Toledo.

The meeting will feature several papers by various firms, and question-and-answer sessions.

This is the agenda of the meeting with the papers to be presented:

• **Oct. 2, a.m.**—Reconditioning, Test and Inspection of Spark Plugs. Paper will be a resume of "Composition of Spark Plug Deposits and Chemical Means for Removing them," by John R. Griffin of E. I. du Pont de Nemours & Co.

• **Oct. 2, p.m.**—Spark Plug Fouling, discussion. Also, Effects of Fuels and Lubricants on Spark Plugs (Paper will be a resume of "Reports on Fuel Additives," by V. E. Yust, Shell Oil Co. and a brief progress report, "Flight Tests Conducted With SB-23 (Ethyl) and TCP (Shell) Scavenging Agents," by BuAer (PP-8), USA.

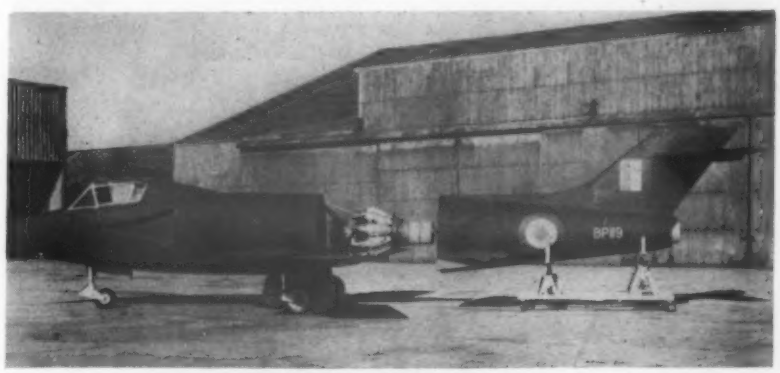
• **Oct. 3, a.m.**—Service Experience. Paper will be resume of "Progress with the Scintilla Low Tension Ignition System," by W. S. Campbell, Scintilla Magneto division, Bendix Aviation Corp.

• **Oct. 3, p.m.**—Research and Development, discussion.

• **Oct. 4, a.m.**—Ignition Analyzers. Papers will be resume of "Progressing with the Ignition Analyzer," by J. W. Wheeler, Sperry Gyroscope Co., and "The Scintilla Ignition Analyzer," by W. S. Campbell of Scintilla Magneto.

• **Oct. 4, p.m.**—Magnetoes, Harness, Leads, discussion.

Transportation will be available to those wishing to visit Champion's Toledo and Detroit plants on Oct. 5.



SPLIT MOCKUP

Boulton Paul P. 119 shown in mockup form, has been developed privately by the firm as a jet-engined side-by-side fighter-trainer. The mockup has been split to show ease of accessibility to the Rolls-Royce Derwent powerplant. The plane has also been designed as a carrier-based version with folding wings, can also be fitted with the Rolls-Royce Nene engine. Span is 38 ft. 9 in.; length 42 ft. 5 in.; height 12 ft. 3 in.; wing area 298.5 sq. ft.; gross weight 9,650 lb. Top speed with the Derwent is given as 475 mph. at 22,500 ft., and the climb to 20,000 ft. as 7.5 min.

Lockheed Plans New Jet Center

Company, hemmed in at Van Nuys, will move all final assembly and flight testing of jets to Palmdale.

By Thomas L. Self

Lockheed Aircraft Corp's announcement that it will build for the Air Force a $12.6-million plant at Palmdale Airport, 65 miles northeast of Los Angeles, is bound to set the industry buzzing.

It was the first hint that any sizeable portion of the aviation industry would actually be set up at Palmdale. Heretofore the airport, which is on the other side of the mountains from Los Angeles and the San Fernando Valley, has served as an alternate field for airliners when the Los Angeles and Burbank fields were weathered in. And passengers who have made the long bus trip to town have testfiied to its remoteness.

► **Jet Center**—Lockheed plans ultimately to do all final assembly and flight testing of its jet fighters and trainers, T-33 and F-94, at Palmdale. The company plans to begin engineering and final assembly, in addition to production flight testing, at Palmdale in late 1952 or early 1953, trucking in sub-assemblies from its plants and subcontractors. Ultimate payroll will be several thousand people, Lockheed says.

What is behind the move? Does Air Force plan to move a substantial portion of the industry to Palmdale? Air Force said the Palmdale project was part of a long-range plan. But it wouldn't say whether it was part of a long-range plan for the industry or for Lockheed.

Robert E. Gross, president of Lockheed, said the company has long foreseen the need for more factory and outdoor space for jet final assembly and flight testing. Further, continually rising production schedules made the additional airport facilities and more maneuvering area mandatory. Existing facilities at Van Nuys cannot be expanded because population has hemmed in the Lockheed factory and airstrips there.

It is well known Lockheed would prefer to stick around the San Fernando Valley. Before taking over the Marietta, Ga., bomber plant, Lockheed said it thought its existing facilities in the San Fernando Valley were adequate for foreseeable future needs.

► **Logical Place?**—Land promoters have long touted the Palmdale area as "the logical place for the aviation industry to build and fly its jet planes." Industry reaction to this was sometimes strong. At an industry dinner over a year ago, J. H. "Dutch" Kindelberger, chairman of the board of North American Aviation, Inc., said: "If the aviation industry moves from Los Angeles, it won't move over the hill and into the desert. It will move a long way from here."

It may be Air Force has a plan for all jet plane builders in Los Angeles area to do final assembly work and flight testing at Palmdale. There have been some efforts to get the jets away from Los Angeles. Currently Northrop flies its F-89 Scorpions at Ontario Airport, 40 miles eastward from the Northrop factory.

Douglas Santa Monica has investigated Palm Springs Airport as an out-of-town testing and flyaway base.

But North American flies its Sabres from Los Angeles International Airport alongside its factory. And Douglas El Segundo does the same with its F3D Skyknights.

Lockheed's move may be a logical extension of its move earlier this year to set up a jet delivery depot at Palmdale. The $400,000 hangar for the depot is nearing completion. Palmdale's runways are now 7,500 feet, but are being lengthened to 10,000.

Though only 3,000 people live at Palmdale, staffing of the Lockheed plant is not expected to be difficult. Atomic energy plants were built in remote areas and communities grew up around them.

Lockheed says the Palmdale installation will not affect the 27,000 employes in its San Fernando Valley plants.

FIRST TWIN BONANZAS DELIVERED

Smartly lined up are the first Beech Twin Bonanza light transports to be delivered from Wichita. Included is a plane for Lycoming-Spencer division of Avco, maker of the engines, to be used for research and executive travel between the firm's plants; one for Carco Airlines, which operates a transportation facility between Albuquerque and Los Alamos for AEC personnel; and two demonstrators. Beech has confirmed orders with deposits for more than 100 of the six-place transports.

Atomic Plane Seen Flying by 1954-56

USAF announcement of award of a development contract to Consolidated Vultee Aircraft Corp. to build the first U. S. airplane to be powered by an atomic engine has confirmed the AVIATION WEEK forecast of last March 5, the Consolidated Vultee was likely to have the edge among U. S. manufacturers to build this airplane.

It is likely that the first flying test bed for the atomic engine will be similar in size and configuration to the Convair B-36 bomber, and may use conventional powerplants as standby power, for flight testing the atomic engine.

The brief announcement heralding one of the most significant milestones in the aviation industry history stated only that "primary responsibility of the firm under contract will be the development of the airframe".

Work on the nuclear reactor for the powerplant is underway by the General Electric Co., the negotiations for this phase were announced last February.

► **Cost and Time?**—Neither cost of the first atomic-powered plane nor the probable time until the plane will be in test flight have been officially indicated. But, Air Force sources say that its flight date is not too far distant.

Some Air Force comments among informed circles places first flight of the atomic-powered Convair plane between late 1954 and 1956. General consensus is that the plane will fly some time during 1955 and that it will not be markedly different from the present B-36 in configuration.

Big disagreement, however, is centered around how energy of the nuclear reactor will be converted to propulsion. Some favor a turbojet type of propulsion; others insist that propellers will

provide the most efficient type of propulsion.

▸**Engineers' Favorite**—An AVIATION WEEK survey disclosed that most engineers saw the conversion of atomic energy to delivering shaft horsepower turning a propeller as the most probable. It was pointed out that if nuclear energy were used with a heat engine similar to that of the ordinary combustion engine the most simple method of energy transference would be to a driveshaft and the propeller.

Navy had announced a little less than a month ago that it had let a contract with Electric Boat Co., Groton, Conn., for construction of an atomic-powered submarine. Estimates of the cost of the experimental submarine have been approximately $30 million for the complete hull and another $25 million for the engine.

Unofficial sources have predicted that an atomic submarine would be launched within two years and that 1960 would see a considerable number operational within the U. S. submarine fleet.

J-42 Overhaul Time Set at 1,000 Hours

Overhaul time for Pratt & Whitney Aircraft's J-42 jet engine has been boosted to 1,000 hr. About two years ago the engine started at 150 hr., later climbed to 500 hr.

Authorized by the Navy, the 1,000-hr. period is the highest specified for turbojets in any branch of the military services, and puts the J-42 in a category comparable to P&WA's piston engine overhaul level (800 hr. for the R-4360, 1,400 hr. for the R-2800 and R-2000).

Reports are that as a result of the new overhaul limit, the Navy actually has reduced orders for the J-42, because fewer engines and spare parts will have to be stocked. Maintenance savings resulting from the extended time period should also be extensive.

Installed in the F9F-2 Panther, the J-42 is serving with both the Atlantic and Pacific fleets, with shore-based Marine air groups, and with squadrons in the Korean action.

During the last year, the engine has logged more than 100,000 hr. in the air. In the past two years, the engine has been flown about 150,000 hr. without loss of a turbine blade, it is reported.

Battle damage reports indicate the engine's ruggedness. One engine, hit by machine-gun fire had its combustion chamber pierced, the bullet passing through to the nozzle guide vanes, then curling many of the turbine buckets. Pilot reported a "slight jar" but continued at full power for 20 min., then for 1 hr. and 20 min. at cruising speed to reach base. Only effect appeared to be slightly higher fuel consumption and 2% increase in rpm.

In another plane, the J-42's rear inlet air screen was hit, the bullet passing into the rear face of the compressor, chewing up several of the vanes. Pilot is reported to have made 40-min. flight back to base without loss of power.

Meanwhile, Hamilton AFB reports 1,000 hr. chalked up for a Thunderjet's Allison J-35 without a major overhaul, although authorized time is 500 hr. The engine had been delivered to the 78th Fighter-Interceptor Group at Hamilton in April, 1949, and has powered seven different planes, undergoing since then six minor repairs by base maintenance shops at a cost of $5,569.

Contracts Set Under Air Mobilization Plan

Air Force will soon sign contracts with the airlines paying them to modify their four-engined planes to be ready to meet overseas requirements of the military on 48-hour notice. This is disclosed in the final Civil Aviation Mobilization Plan of the National Security Resources Board, released by Commerce Undersecretary Delos Rentzel last week.

Materials for the modification aren't on hand yet, but it is expected Air Force will make them available after modification contracts are signed. Modification of radio, navigation, fuel systems and emergency equipment will add 100 pounds to each plane.

Other highlights of the civil air mobilization master plan:

• **Total number of planes** to be contracted to military service is agreed on between civil and military officials.

• **Which airlines** shall furnish how many planes for MATS contract operation is set, but the information is confidential.

• **Few Allies** have yet committed themselves to a U. N. transport mobilization plan. NSRB urges: "efforts should be intensified to align friendly foreign air transportation to supplement U. S. airlift."

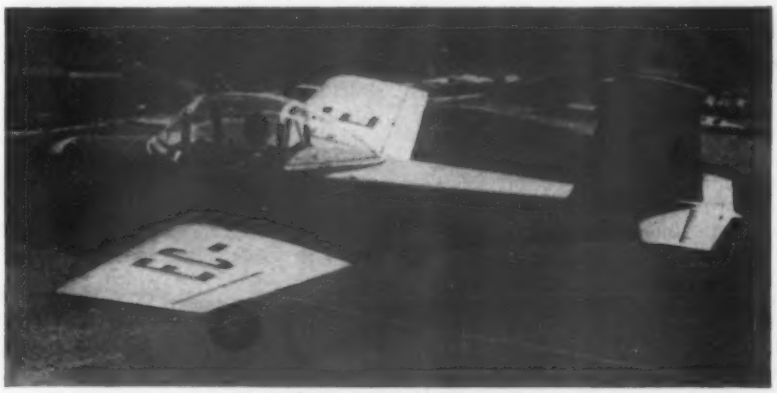
• **Air transport manpower** shortage would be critical in emergency. Military manpower authorities are believed ready to defer men in airline transport, but not executive transport.

• **Joint airport use** by civil and military is already arranged for several airfields. ACC joint use panel is functioning reasonably smoothly.

• **Airways program is lagging,** "implementation programs for airways equipment must be accelerated and a pool of airway and traffic control equipment established and held in reserve for unpredictable mobilization requirements."

• **Training schools are closing** "at an alarming rate" for lack of business; "there is no evidence of additional planned military utilization of U. S. commercial flight, ground or vocational training institutions." NSRB urges military not to set up any more training facilities of their own until they've used all available civil facilities.

• **Repair bases languish,** though now barely adequate, for want of a definite military policy deciding whether to contract much overhaul and maintenance at civil shops. NSRB urges that Congress appropriate no more funds for new military depots "until an independent survey has determined the need for them over and beyond existing civil capacity." Military services are surveying the civil facilities and claim they will make fuller use of civil facilities next year.



SPANISH SPORTSTER

Trim Iberavia I-11 two-seat, side-by-side, low-wing, all-wood lightplane made its first successful flight test July 16. Believed to be the first of its class to be designed and built in Spain, the I-11 is powered by a four-cylinder 90-hp. Continental which gives it a top speed of approximately 120 mph. at gross weight of about 1,500 lb. It spans approximately 36 ft. The large cockpit canopy aids in providing optimum visibility. The I-11 also is equipped with tricycle fixed landing gear.

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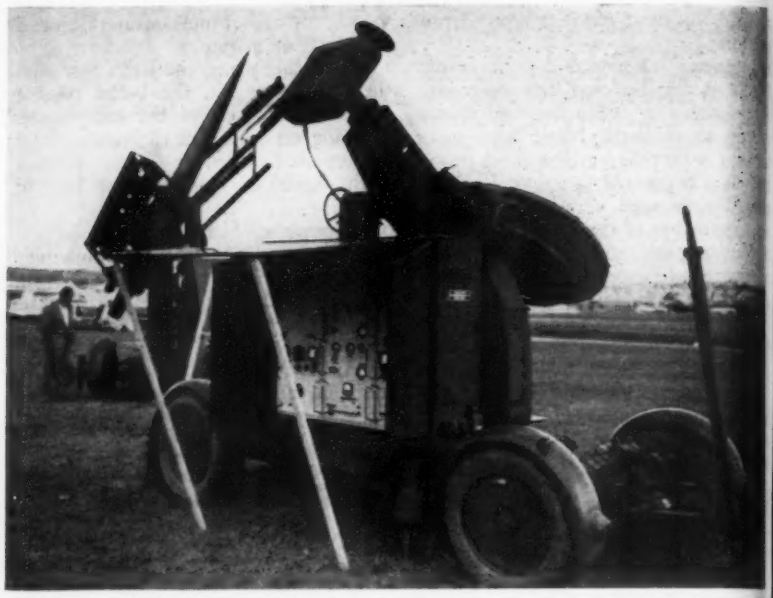


GROUND CONTROL radar guiding it are both trailer-mounted and operated.

Swiss Show Anti-Aircraft Guided Missile System

The Swiss firm of Oerlikon, famed for its armament developments, has produced and displayed publicly a new weapon—a complete anti-aircraft missile system.

In what probably was the first such showing anywhere, the Oerlikon Machine Tool Works, Buehrle & Co., of Zurich, early this month exhibited a missile and its control system at the Swiss National Air Display, Dubendorf Air Base, Zurich.

The missile was displayed in its launcher, with ground-control radar on an adjacent trailer. The manufacturer also showed three new aircraft rockets designed for fighter armament. Oerlikon probably is best known for its 20-mm aircraft cannon.

▶**Deadly Looking**—The missile is of unsophisticated appearance; its body is about 16 ft. long with fineness ratio of about 12. Four short cruciform wings are mounted on the body at about the two-thirds point. The general configuration of very thin wings and high fineness ratio hint at supersonic performance.

A liquid-fuel rocket motor is used for propulsion and presumably for steering, since no external aerodynamic surfaces are fitted.

Guidance system is of the beam-rider type with a range said to be about 12 miles. The mobile beam transmitter, which uses both a large dish antenna and a smaller, different antenna, was developed by Brown-Boveri Co., of Baden, Switzerland.

▶**Launching Trailer**—The launching stand is mounted on a four-wheeled trailer which resembles those used for mobile anti-aircraft artillery in this country. Two box-section vertical members support two pairs of parallel guide rails which can be elevated or lowered. The whole assembly can be traversed.

The missile is supported in a frame which slides along the four guide rails. The frame-missile combination is mounted at a considerable angle of attack within the guide rails, presumably to guarantee initial lifting force at the launch.

Although no booster rocket (or rockets) was shown with the missile, the peculiar arrangement of the frame in the guide rails hints at the use of a booster. In the first place, the frame is mounted in piggy-back style so that if boosters were fitted to the frame, they would be structurally clear of the missile. In the second place, the geometry of the layout places the blast of the supposed boosters well clear of the launching structure, which is of course, very necessary. And in the third place, there are holes in the forward and aft cross members of the frame which could be lightening holes, but which probably are guides or positioners for four booster rockets. There are no current missiles of this general size and possible performance which can get away without the use of a booster.

▶**Aircraft Rockets**—Three new aircraft rockets were also shown at Dubendorf. One was a 5cm (about 2-in.) rocket used for practice, but which could also be fitted with a warhead. The other two were basically the same 8cm (about 3-in.) rockets, one fitted with an armor-piercing head and the other with a high-explosive head.

The rocket motor and case assembly weigh 22 lb. The casing is cylindrical, with four stabilizing fins. The fins are pierced with oblong holes, two per fin. The motor discharges through a multi-orifice nozzle in the base of the rocket.

It is claimed that the armor-piercing head uses a shaped charge which can penetrate 10 in. of armor. Maximum speed is reported about 2,000 fps.

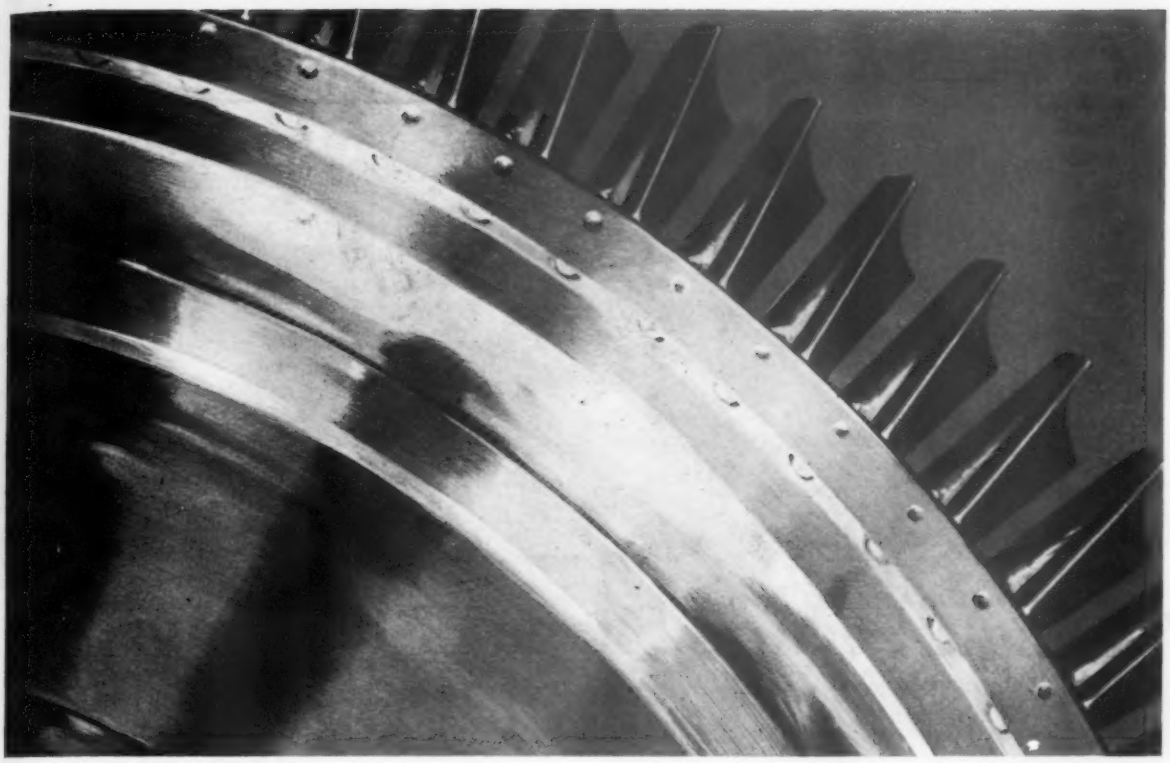
With double launching racks, a total of 20 of the 8-cm rockets can be fitted to the North American F-51 fighters. Swiss de Havilland Vampire jet interceptors carry four of the double launchers, in which the rockets are mounted in a nose-to-tail fashion. The forward row of five rockets is above the thrust line of the lower, rear rank; if necessary, it appears that the rear row could be fired first.

French Gas Turbines To Be Built Here

Manufacturing rights to a group of nine gas turbines have been acquired by Continental Motors Corp., Detroit, from Societe Turbomeca, of France.

These units, perfected to the production stage, span a power range equivalent to 200-1,100 hp. One of the engines is a ducted-fan design.

Initial production is slated to be handled by a Detroit subsidiary company—Continental Aviation and Engineering Corp.—which is being expanded to take on the new projects.



First gas-turbine locomotive in America has "16-25-6" in turbine wheel rim

THE steel that solved the problem of terrific stresses in aircraft turbo-supercharger rotors was "16-25-6"—a stainless alloy developed by the Timken Company. Commercial production of "16-25-6" for jet engine rotors helped make jet propulsion practical.

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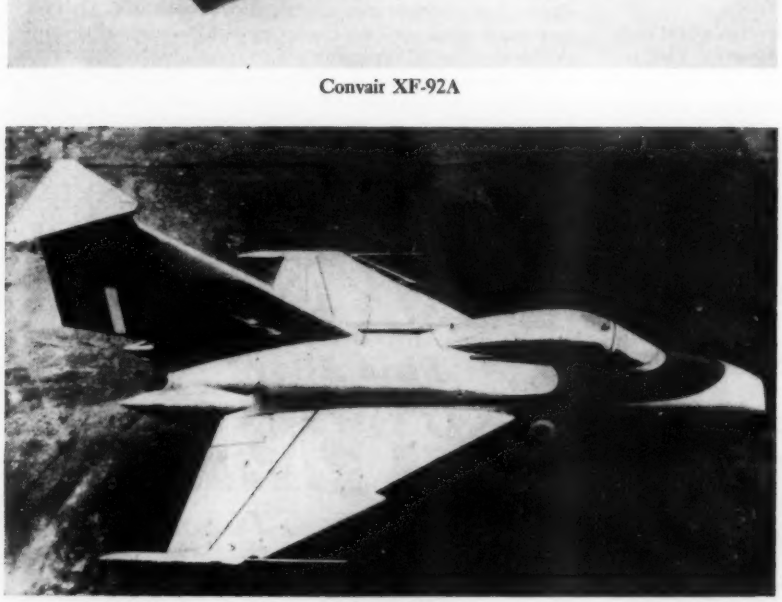
Avro 707B

Triangle Seen as Shape of the Future

Convair XF-92A



Fairey FD1

Delta wing helps on aerodynamic problems of highspeed flight.

Considerable emphasis has been placed lately—both here and abroad—on the delta wing configuration for high-speed flight.

Research on this type of aircraft has been pushed to the point where the merits of the triangular wing scheme have unmistakably established the configuration as a member of the aeronautical fraternity. It is no longer an aerodynamic curiosity.

Optimistic notes on the delta-wing aircraft's characteristics were recently compiled by J. R. Ewans, chief aerodynamicist of Britain's A. V. Roe & Co. Ltd., at Manchester. This company has put three delta-wing craft into the air—the 707, 707B and the 707A, which made its first flight only a short time ago (AVIATION WEEK Sept. 3, p. 17).

The idea of using the triangular planform stems back to Germany's Dr. Alexander Lippisch, who was associated with Messerschmitt A. G. Lippisch's investigations led to the conclusion that this planform was most suited for flight in the sonic region.

By the end of the war, Lippisch had a number of delta-wing projects underway. Included was an unpowered wood glider intended for studies of the delta's low-speed characteristics. This was only partly constructed and was later completed under U. S. orders and brought to this country for investigation.

The delta configuration was studied by many other aeronautical experts. At

the 1947 Anglo-American Aeronautical Conference in London it was recommended strongly by Professor Theodore von Karman.

Already, five contemporary basic U. S. and British designs have materialized. And Ewans says it is pretty certain that others are on the way. The present configurations, in the order of their first flights, are Convair's XF-92, Avro's 707, Boulton Paul P.111, Douglas XF-4D, and the Fairey FD-1.

Ewans' notes are intended to show why there is such interest in the delta wing, and the advantages it promises the aircraft designer. He develops his theme in a basic manner.

▸**Designer's Aim**—Ewans emphasizes that the delta wing is of value only for very high-speed aircraft, this necessarily implying the use of jet engines at this time.

When projecting the high-speed plane, he says, the designer will attempt to produce an aircraft carrying the greatest payload for the greatest distance, at highest speed, and for the least expenditure of power, that is, using the least quantity of fuel. This applies to all types of craft—bombers, where payload is bombs; civil planes, where it is passengers or cargo; or fighters, with guns and ammo.

▸**Speed, Altitude Problems**—Most fundamental factor determining what is achieved, says Ewans, is the altitude at which the aircraft flies. At higher altitudes, lower air density results in a decrease of aircraft drag and it is possible to fly at a given speed, at say, 40,000 ft., for an expenditure of only one-quarter the power required at sea level.

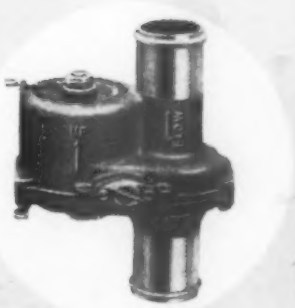
As a plane approaches the speed of sound—about Mach 0.7 for a conventional aircraft—the effects of compressibility become important, the characteristics of the airflow changing fundamentally. There is a very large increase in drag, and to push the speed any higher an excessive expenditure of power is required.

With transport and bomber planes, the speed where the drag starts to increase—known as the drag rise Mach number—becomes the maximum cruising speed, because if the plane is flown at higher speeds, the disproportionally higher thrust required means excessive fuel consumption and loss of range.

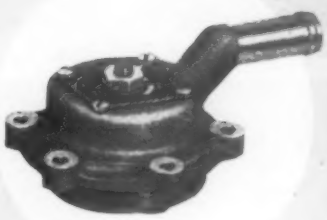
At a somewhat higher Mach value, there will be changes in the stability of the aircraft and in its response to the controls, leading possibly to complete loss of control.

To boost the speed range, the aircraft must be designed to overcome or delay these effects.

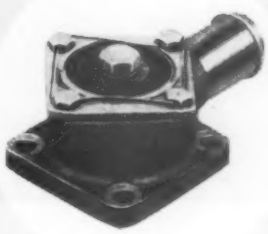
▸**Hold Drag Rise**—It appears possible by careful aerodynamic design, says Ewans, to delay rise in drag until a Mach value in the region of 0.9 is reached—and this figure is likely to be



Crankcase pressurizing valve



Oil tank vent valve



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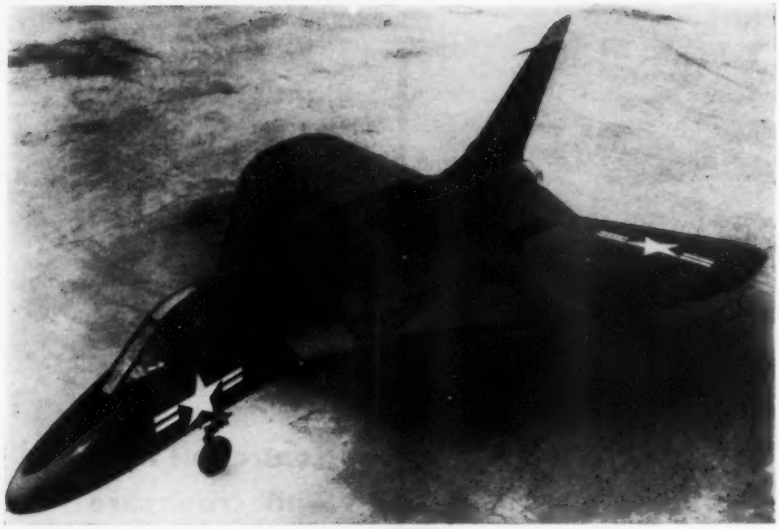
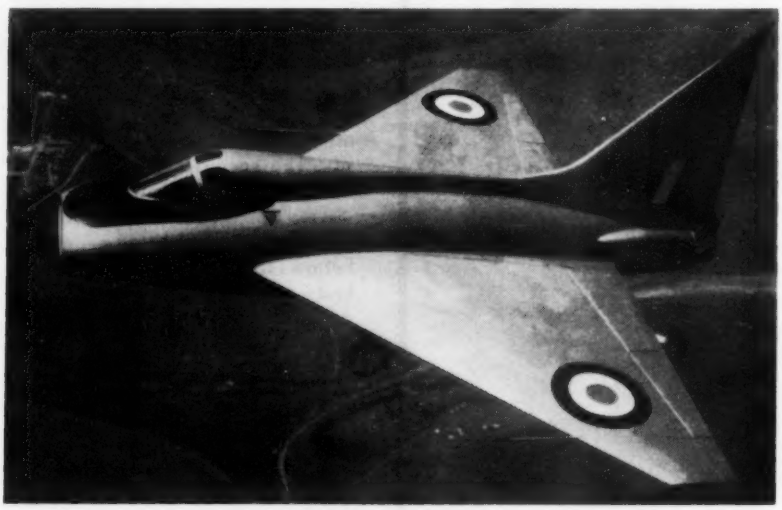


Douglas XF4D



Boulton Paul P.111

the practical limit of cruising speed for transport aircraft of all types for many years to come.

The designer of a civil plane, bomber, or long-range fighter, he says, will therefore bend all his energies to achieving a Mach number of this order without any drag rise. And he must pay attention to stability changes or lack of control which might occur in this region. This will occupy his attention to the same extent as the purely performance aspect of the drag rise.

► **High Mach Design**—Ewans contends that it is quite easy to design a fuselage shape which is relatively immune to Mach number effects. The wing design is difficult—particularly because a wing that is suitable for high speed must also give satisfactory flying properties at low speeds—in takeoff and landing, for example.

As the air flows past a wing, its speed is increased over its upper surface to a considerable extent, and over the lower surface to a lesser extent—so that there is greater suction on the top surface than on the lower. This difference results in the lift which enables the wing to sustain the aircraft's weight.

Thus, at whatever speed the aircraft is flying, the speed of the air around the wing will be higher.

With a plane flying at Mach 0.8, the speed around its upper surface will be equal to or may easily exceed sonic speed. At this stage, the wing airflow pattern will be considerably changed. And it is this change that gives rise to the drag and stability effects previously mentioned.

Ewans advances that there are four ways of improving the high-Mach-number behavior of the wing—different methods of keeping down the air velocities around the wing—all of which can

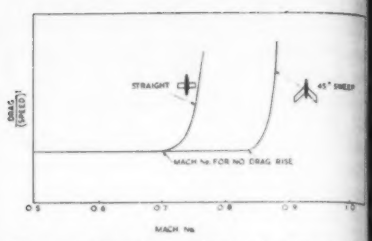


Fig. 1. Effect of sweepback of wing on drag at high Mach numbers.

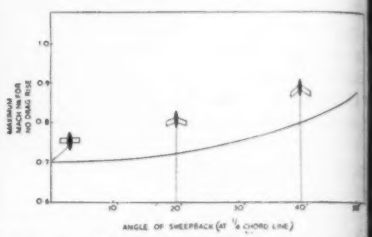


Fig. 2. Effect of sweepback of wing on Mach number for no drag rise.

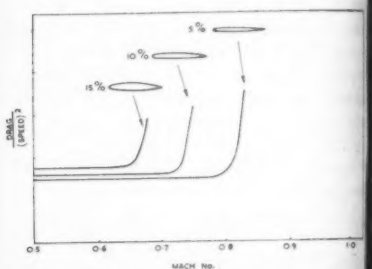


Fig. 3. Effect of thickness-chord ratio on Mach number for no drag rise.

be applied simultaneously: sweepback, thinness, low wing loading, and low aspect ratio.

• **Sweep.** Extent of gains possible from sweepback is very considerable, says Ewans, holding that wing sweep may easily lead to a postponement of the compressibility effects by a Mach value of 0.1. This is illustrated by Ewans in Fig. 1, which compares the drag rise of an unswept wing with one that has 45-deg. sweep. Drag rise for the former occurs at 0.7 and for the latter at 0.83. And Fig. 2 shows how the drag rise Mach number is increased by sweepback.

• **Thinness.** By keeping the wing thin, the amount of air that must be pushed out of the way of the airfoil is reduced, easing its passage through the medium.

Thickness-to-chord ratio—measurement of wing thickness—in the past has ranged from 21% to perhaps 12%. But now, values of 10% down to 7% are becoming common. An indication of the benefits is shown in Fig. 3.

• **Low Wing Loading.** Mach effects are delayed by keeping the wing loading as low as possible—by supporting the aircraft weight with a large wing area. This is particularly important for high

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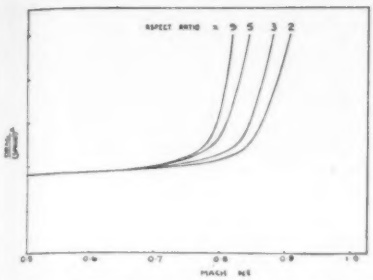

Fig. 4. Effect of aspect ratio of wing on drag at high Mach numbers.

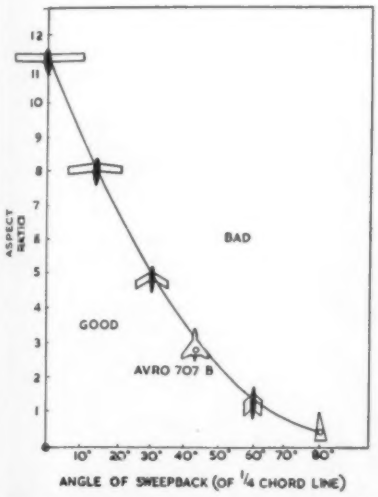

Fig. 5. Relation between aspect ratio and sweepback for stability at the stall.

altitude flight, where the low air density puts a premium on keeping the wing loading low.

• **Low Aspect Ratio.** For moderate speeds, a high aspect ratio—large span relative to the chord—gives greatest efficiency. This consideration, says Ewans, is no longer important at high Mach numbers. Some alleviation of compressibility effects, he holds, is obtained by reducing aspect ratio (Fig. 4).

Another reason for choosing a low aspect ratio: One of the disadvantages of wing sweep is that flying characteristics at low speed become poor. A typical symptom is that the tip of the sweptback wing stalls, giving violent behavior if the speed falls too low.

But research has shown, reports Ewans, that this bad characteristic of highly sweptback wings may be overcome relatively easily. Fig. 5 is a graph of sweepback vs. aspect ratio, compiled from a large number of tests of wings with various planforms. Each planform has been classified as giving good or bad characteristics.

It is seen that although almost any aspect ratio can be accepted for an unswept wing, for a 45-deg. sweptback foil a ratio of a little over 3 is best.

A third reason Ewans reports for choice of a low aspect ratio is behavior (as regards stability, etc.) in the high Mach number region. Compressibility effects are minimized and a transition of speeds below sonic to sonic and above is more readily accomplished if the aspect ratio is low—in the order of 2 to 4.

▶ **Delta Planform**—If these foregoing requirements are lumped, the result is a highly sweptback aircraft, with thin wing, moderately large wing area, and low aspect ratio. Consideration of geometrical properties and possible planform of wings leads to the conclusion that the delta wing is the only form which satisfies these requirements, Ewans contends. The configuration possesses high sweepback and low aspect ratio, the wing's area will, of necessity, be generous for the size of the aircraft, and it is easy to build with a low thickness-to-chord ratio.

How does the delta planform, indicated from considerations of aerodynamic performance, line up with practical design requirements, and in particular, the overriding necessity for keeping weight and drag low in order to obtain maximum performance?

▶ **Tail Factor**—A preliminary point is whether a tailplane (horizontal tail) is necessary. The point long has been raised as to whether aircraft can be flown satisfactorily without a tailplane. Considering only the case of high-speed

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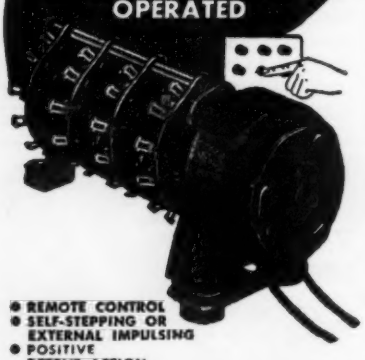

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jet aircraft, each of the functions of a tailplane can be examined, in turn, in relation to the delta-wing aircraft. A tailplane functions to:

• **Trim out changes of CG** position according to the load carried and the consumption of fuel. Investigation has shown that a control surface at the trailing edge of the wing, provided that the latter has a large root chord (as the delta), can accommodate all but the extreme CG movements.

• **Deal with trim changes** due to landing flaps, etc. With the low wing loading associated with the delta wing, takeoff and landing speeds are moderate without the use of flaps, and this question does not, therefore, arise.

• **Provide damping** of pitching oscillations. The reduction of damping of the pitching oscillation has led to difficulty on some tailless aircraft, but it does not arise on the delta, since the large chord near the root gives adequate damping.

• **Deal with loss of stability** or control power resulting from distortion of the wing structure at high speed (aeroelastic distortion). At very high speeds, all aircraft structures distort to a greater or lesser extent under the high loads imposed, and this distortion alters the aerodynamic form.

In extreme cases this leads to loss of stability or control power, making the aircraft dangerous or impossible to fly at high speeds. An aircraft with a high aspect ratio swept wing would need a tailplane to deal with this, but the shape of the delta wing makes it extremely stiff, both in bending and in torsion, and a tailplane does not appear necessary, says Ewans.

• **Provide for spin recovery.** Although the point has not been proved, says Ewans, it is expected that the controls on a tailless delta wing would not be powerful enough to insure recovery from a fully developed spin. A tailplane appears to be the only way of dealing with this. This restriction is of no significance for transport or bomber aircraft for which spinning does not arise, but on fighters and trainers a tailplane would appear necessary.

Ewans concludes that for a delta wing aircraft of the transport type, a tailplane is unnecessary. Its omission leads immediately to a considerable saving of weight and drag, and to a major gain in performance.

▶ **Complexity Reduced**—Compared with a conventional aircraft, the delta wing aircraft will, therefore, be simpler by the omission of these items: the tailplane, the rear fuselage necessary to carry it, wing flaps and other high lift devices such as the drooped wing leading edge.

There is a considerable saving of weight, of design and manufacturing effort, and also of maintenance. These economies will have considerable bearing on the initial cost and the manpower necessary to produce and maintain a number of aircraft.

▶ **Large Volume**—Because of its shape and the large root chord, the delta wing provides a large internal volume in relation to its surface area, even when using the thin wing sections, which are essential for high-speed aircraft.

Ewans holds that for the same wing area, the delta wing has 33% more internal volume than an untapered wing, while if the inboard half of the wing only is considered—since this represents a more practical case from the point of view of the aircraft designer—the internal volume of the delta is more than twice that of the corresponding untapered wing.

Without exceeding a wing thickness of as little as 8 to 10%, Ewans says it is possible on a moderate size delta wing aircraft to bury completely the engines, landing gear, and sufficient fuel tanks, for a very considerable range. The fuselage also has a tendency to disappear into the wing at the root.

The result, he contends, is an aircraft consisting only of a wing, a fin and a rudimentary fuselage, representing a degree of aerodynamic cleanliness which has never before been reached. This is achieved at the expense of a rather larger wing area than usual, but investigation shows that drag of this area is considerably less than that due to a conglomeration of engine nacelles, tailplane, etc.

▶ **Structural Design**—From the design point of view, the shape of the delta wing leads to an extremely stiff structure without the use of thick wing skins, and strength becomes the determining feature rather than structural stiffness. This avoids the inefficiency of conventional sweptback wings where the wing has to be made stronger than necessary so that it will be stiff enough. And the delta wing lends itself to conventional design techniques, and to conventional methods of airframe construction.

Summarizing his analysis, Ewans says that to meet the requirements of large loads for a long range, at high speed, the high-performance transport or military aircraft of the future will cruise at a considerable altitude, at a speed not much below sonic. The delta wing provides the only satisfactory solution to these requirements, he maintains, for these reasons:

• It meets the four features necessary for avoiding the drag rise near the speed of sound, it is highly sweptback, can be made very thin, wing loading is low, and aspect ratio is low.

• Extensive windtunnel and flight tests have shown that the low aspect ratio delta wing gives minimum change in stability and control characteristics at

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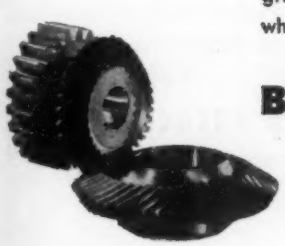

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speeds that are near the speed of sound.
• Even though thin, the delta's internal volume is large, so that the engines, landing gears, fuel and all the necessary equipment can be contained within the wing and a rudimentary fuselage.
• Adequate control can be obtained by control surfaces on the wing, thus eliminating the need for a conventional tailplane. Together with the "burying" advantages just mentioned, this leads to considerable reduction in drag, and, therefore to high performance.
• Auxiliary devices such as flaps, nose flaps, slots and the all-moving tailplane are unnecessary, thereby saving weight and design effort, and simplifying manufacture and maintenance.
• Makeup is very stiff and free from distortion troubles.

NACA Reports

▸**A Numerical Approach to the Instability Problem of Monocoque Cylinders (TN 2354)—by Bruno A. Boley, Joseph Kempner and J. Mayers.**

This investigation fills two purposes. First, a method is presented which is fairly short and reasonably accurate for the calculation of the buckling load of a monocoque cylinder. Second, a further experimental check (of methods developed earlier by the senior author) is afforded by comparing the theoretical and experimental buckling loads for the cylinders considered.

▸**The Use of an Uncalibrated Cone for Determination of Flow Angles and Mach Numbers at Supersonic Speeds (TN 2190)—by Morton Cooper and Robert A. Webster.**

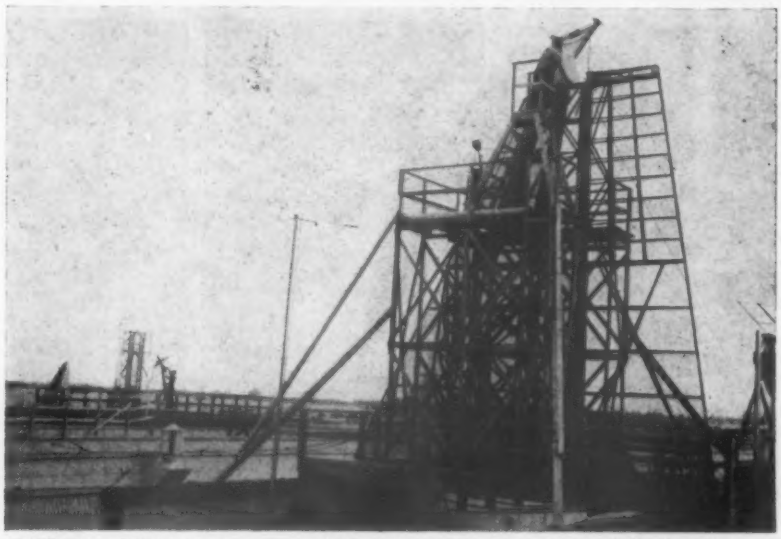
Considerable effort has gone into the development of a means for determining the velocity and attitude of aircraft and missiles at transonic and supersonic speeds. One suggested type of sensing device has been a cone with four equally spaced radial orifices and a total-pressure tube at the apex.

This paper analyzes the results of pressure distribution measurements which were obtained over the forward portion of a slender parabolic body of revolution. These measurements were made in the Langley 4′ x 4′ supersonic tunnel at a Mach number of 1.59.

Results show that by a simple averaging process, the free-stream Mach number could be predicted within 0.01 up to incidence angles of about 8 degrees. Further increases in incidence angle resulted in overestimating the Mach number by as much as 0.05.

Up to an angle of attack of 10 degrees, the angle of attack and the angle of yaw were predicted within 0.5 degrees. —DAA

AVIONICS



VERTICAL SCREEN structure at right is electrical replica of Convair B-36 tail.

Antennas Tested on Tail Skeleton

Atop the roof of one of the buildings of Consolidated Vultee Aircraft Corp.'s San Diego division is a skeleton structure covered with fine mesh screen. This structure is an electrical replica of the vertical tail of the B-36, and it is on the roof for the sole purpose of developing and testing flush antennas.

Last December the electronics laboratory at Convair purchased antenna test equipment in order to do research and development on flush designs. (This was an alternate to Convair's subcontracting the job to some research institute.) Tests began this April on the designs.

The current tests involve changing the location of 12 radio antennas from B-36 wings, tail and fuselage and repositioning them inside the metal skin of the vertical tail.

RTCA Seeks Uniform Test Procedures

The Radio Technical Commission for Aeronautics has recently distributed an official paper dealing with test procedures for airborne radio equipment operating in the range from 30mc. to 400mc.

There are two major objectives of the presentation. The first is to establish standard test procedures for aeronautical airborne radio equipment which would provide a means for the collection and interpretation of data on any equipment, regardless of where tested or by whom.

The second objective is to establish minimum performance requirements based on the operational needs of the aeronautical services. This will provide a means of determining whether or not the airborne radio equipment may be expected to perform its intended function.

The paper was prepared by RTCA Special Committee 13, and bears the number 76-51/DO-32. Full title is "Test Procedures—Airborne Radio Equipment Operating Within the Frequency Range of 30 Megacycles—400 Megacycles."

Miniature Resistors

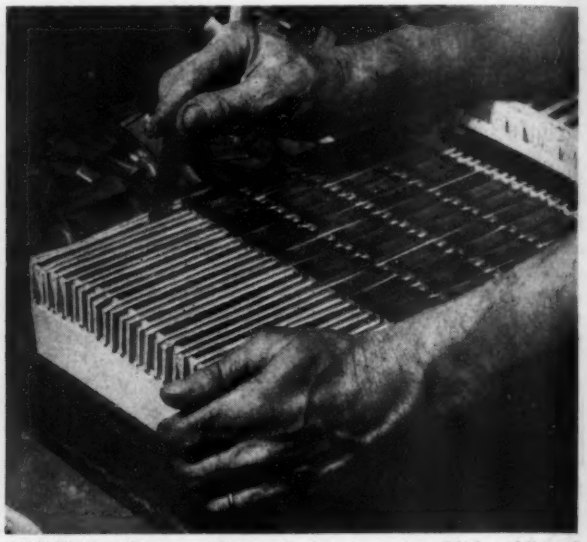
The Shallcross Manufacturing Co., Collingdale, Pa., has announced a line of miniature hermetically sealed resistors with solder lug terminals. The resistors are designed to meet the requirements of JAN-R-93, characteristic A, style RB11.

The units are heremetically sealed in Steatite by a proces patented by Shallcross. Manufacturer says that the process provides positive immunity against humidity, fungus and salt water.

Dimensions of the resistors are 19/32 in. long, ¼ in. diameter. Their rating is 0.25 watts at 250 volts. Resistance values of 0.1, 0.3 or 0.4 megohms may be obtained depending on the alloy wire used for non-inductive winding.

These resistors are described in the company's resistor bulletin R-3b.

MOLDING takes place after cavity is filled with powder metal. Dies last 30-50 times longer than drop forge dies.



COINING follows molding and sintering, gives blade additional strength by further compression.

Powder Metal Boosts Jet Blade Output

Thompson says 250,000-a-month rate could be raised to 50 million; Rolls-Royce engineers study process.

Jet engine compressor stator blade production—250,000 a month—at reduced cost, fewer skilled manhours, and large savings in critical materials. This is the production achievement which lured Rolls-Royce engineers to Thompson Products plant in Cleveland, Ohio, to study the highly successful application of powder metallurgy know-how.

"Sold" on the study idea by Fred Crawford, Thompson's president, during his recent European visit, Rolls-Royce is now considering a possible license for using the Thompson process in England to meet that country's critical need for jet engine blades.

Britain's requirements for the blades are considerably lower than the reported 500,000 a week used in the United States at the present time. But raw materials and manpower shortages in Britain are serious—to the point where some means of increasing production for the vital blades is imperative.

▶ **Potential Great**—By the powder metal process practised at Thompson, company officials estimate that 50 million of the blades could be turned out a month, if the need arose. They have already stepped up their production from 100,000 to 250,000 a month since the first of the year.

Thompson researchers, headed by K. M. Bartlett, now manager of the company's new Metallurgical Products division, worked out their process after several years of cooperation with American Electro Metal Corp.'s staff, under Dr. Paul Schwarzkopf, a world authority on powder metallurgy.

The Allison division of General Motors was also an important part of the initial research team, since it offered its complete testing facilities. Blades made by the process have been in use in Allison's J-35 jets since 1948.

The powder metal jet engine blades have a number of advantages:

▶ **Materials Eased**—Raw materials are easy to get. Principal material used is iron powder made by a special process from mill scale, a steel mill by-product. A stearic acid lubricant (Sterotex) also is used, and relatively small amounts of powder copper are melted and infiltrated into the powder iron blade. The resulting product is called TP-1, has a tensile strength higher than many of the steels.

Many tons of valuable strategic materials are saved by the powder metal process. Although some chromium and nickel are used in the .0005+-in. blade plating, the amount is comparatively small. But if it were ever necessary to produce the possible 50 million blades by conventional methods, 9,500 tons of alloy would be needed, using 575,000 pounds of chromium.

Conventional forgings contain 12% chromium, but powder metal blades require only .1% chromium, plus .5% nickel.

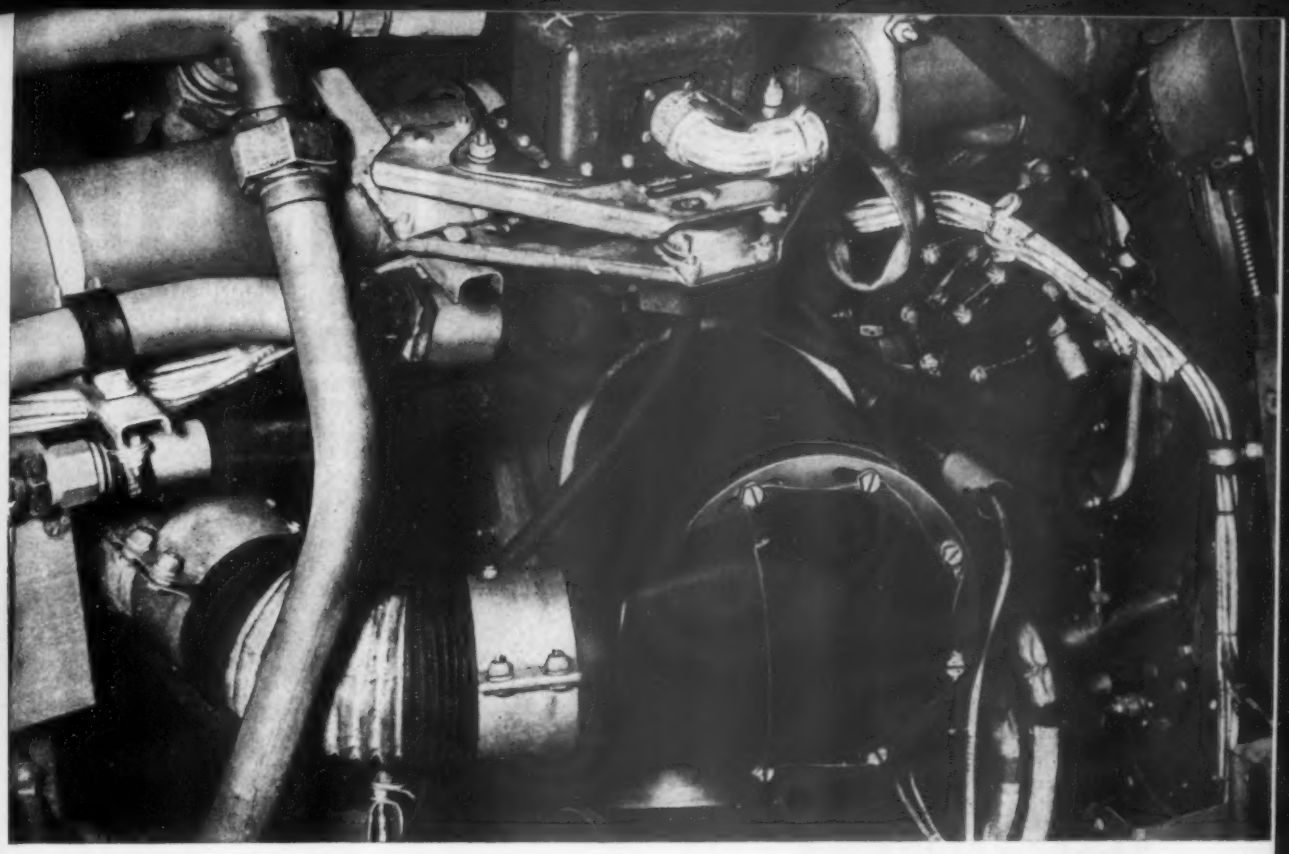
▶ **Conservation, Strength**—There's no waste from TP-1 powder metal blades. Forging or casting blades leave a lot of flash. Thompson officials estimate 50% wastage in the production of jet engine blades the old way, plus the extra steel mill capacity needed to reprocess the scrap.

Both stator and rotor blades in jet engine compressors need high strength. TP-1 blades are strong and tough. Tensile strength of the blades now being produced is greater than 110,000 psi., and can withstand a minimum 20-deg. bend without cracking.

Production tests show random blades are being bent to between 40 and 50 deg. before cracking occurs. The blades have satisfactory resistance to high-velocity impact. Differing from the 70 to 80% density of ordinary powder metal products, TP-1 blades are practically 100% dense.

▶ **Spray Resistance, Damping**—Their corrosion resistance, provided by the .0005-in. nickel plate, plus a flash of chromium, is higher than 403 stainless steel, proved by 48-hr. standard salt spray corrosion testing, Thompson says.

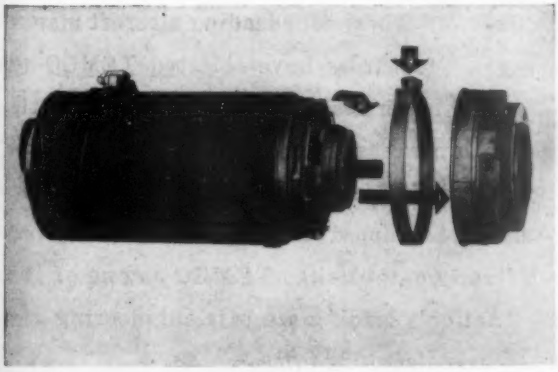
And an outstanding characteristic is



IN THE NEWS

NEW GENERATOR MOUNT SAVES TIME AND MONEY

This snake pit is a mechanic's nightmare when it comes to removing a generator for routine maintenance. General Electric's new, QAD (quick attach-detach) generator mount eliminates the need for universal joints in mechanics' elbows. Generator replacement time is cut from hours to minutes. The QAD has been selected as an industry standard—for hard-to-get-at installations—by a joint Air Force-Navy committee. It is interchangeable with present generators of equivalent rating.



Simple as one, two, three! 1. Fit generator into slots of mounting ring (permanently mounted on your engine), 2. engage by a slight turn, 3. adjust and tighten clamp ring. The QAD mount can be supplied to fit any G-E aircraft generator. Simple, inexpensive, light weight, the new mounting can be used to mount a generator on piston engines or a starter-generator on jet engines.

One man can replace a generator where two were required before, in a fraction of the time. No special tools required . . . no blind fumbling. And, this time and money saving device may be added to your fleet gradually—as ships come in for overhaul. For further information, call your General Electric aviation specialist or write, ***General Electric Company, Schenectady 5, New York.***

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TEMCO Versatility used by Leading Plane Manufacturers

In six short years Texas Engineering and Manufacturing Company has gained a reputation for versatility that is being recognized by the country's leading aircraft manufacturers. Starting at the end of World War II with a nucleus of highly skilled aircraft technicians and one of the most modern facilities in the aircraft industry, TEMCO continuously has expanded its organization and equipment to meet the growing demand for its services. In the last several months TEMCO has been selected by Douglas, Martin, Boeing and Lockheed to build major assemblies and components. This work includes some of the nation's newest and fastest planes; the A2D Skyshark, the P5M-1 Martin Marlin, the B-47 Stratojet and the P2V Neptune.

Production Engineering Has Set Many Records!

The ability to design tools and develop new and time saving techniques has resulted in TEMCO's being able to set up highly efficient production lines. Engineering ingenuity in the building and installation of jigs and fixtures, in cooperation with the engineers from the contracting companies has been accomplished with almost unbelievable speed.

Facilities Expansion Is Making TEMCO One of Nation's Best

Planned expansion of TEMCO's facilities under a Navy Department contract is progressing without delay. Recent additions include 60-foot spar mills, a photo template machine and a 2,500-ton hydropress, among other items. The press is in addition to a 3,000-ton press previously installed. When complete the new program will give TEMCO one of the finest and most complete aircraft manufacturing facilities in the United States.

TEMCO
ENGINEERS AND MANUFACTURERS FOR THE AIRCRAFT INDUSTRY

DOUGLAS

Martin AIRCRAFT

BOEING

Lockheed

These four leading aircraft manufacturers have selected TEMCO to build major assemblies and component parts for their newest military planes. Production engineering ability combined with one of the finest and best equipped facilities in the country has firmly established TEMCO as one of the nation's leading aircraft engineering and manufacturing firms.

TEMCO
TEXAS ENGINEERING AND MANUFACTURING CO., INC.

Texas Engineering and Manufacturing Co., Inc.
DALLAS, TEXAS

damping capacity, upon which the successful operation of compressor blades greatly depends. In this also, TP-1 is superior to stainless steel 403 it is claimed, although 403 was originally selected because it has twice the damping capacity of ordinary steels.

▸**Problems Simpler**—Little production space is needed—Thompson's present 250,000 blades a month are being turned out in a 12,000-sq. ft. corner of their huge plant.

No heavy drop forge equipment or highly-skilled operators are required.

Dies last 30 to 50 times longer than regular drop forging dies. This greatly alleviates need for critical diemakers and diemaking equipment.

Blades can be turned out at a much greater rate of speed, since a number of machining processes are eliminated. They can be pressed from the powder to precise measurements, are always handled at room temperature.

▸**Fabrication**—Production of the blades has been cut down to these steps:

• **Power preparation.** This is done in an air-conditioned room to control moisture. The powder ingredients are mixed, blended and sifted. From the mixture the blades, pellets and bridges—last two named used in the infiltration process—are molded.

• **Molding.** The molding procedure was one of the biggest "bugs" in the early research because the blades are thicker at the center than the edges. Difficulties were overcome by a design for a mold in three parts. Hydraulic, 250-ton presses supply the pressure and the blade contour is formed by the dies.

• **Sintering.** This is a 1-2 hr. process, with a top heat of about 2000F. in a hydrogen atmosphere. Plans are being projected to change over to dissociated ammonia atmosphere soon.

• **Coining.** This action further compresses the blade. The first molding leaves blade without strength, so that it can be easily broken in the fingers. The sintering and coining operations give additional strength, and coining also adds the proper twist and contour to the blade. Hydraulic presses are used for this process too, and the blade is about 20% porous when coining is finished.

• **Infiltration.** The blade is impregnated with copper alloy. They are racked, root end up, on which a sintered copper pellet is placed. The rack is sent through another controlled-atmosphere furnace at a temperature above the melting point of the copper—about 1980F.—and the molten copper is drawn by capillary action through all the pores of the blade, providing 100% density.

• **Solution heat treatment.** This is done for additional strength, with an immediate oil quench.

• **Press straightening.** Heat treatment and infiltration warp the blades slightly, and it is necessary to restore them to their proper twist and contour.

• **Zyglo.** Blades are immersed in a fluorescent solution and then "developed." When they are inspected under an ultra-violet light, any defects, such as surface porosity and cracks, show up by the glow of the fluorescent solution.

• **Grinding and blending edges.** The airfoil chord width is ground to size by removing stock from the two edges. Edge radii are formed by stropping the blade on an abrasive belt.

• **Precipitation hardening.** This provides the final strength for the blade. Because of the low temperature, no distortion of contour is experienced.

• **Finishing.** Blades are then polished for a perfect plating surface, inspected individually, both on a guillotine gage and by X-Ray. The dovetailed ends are broached and the blades are electroplated, using .0005 in. of nickel and less than .0001 in. of chromium.

Although Thompson is, as yet, using these blades only for stator applications, the company is now in the tooling stage for production of the more highly-stressed rotor blades.

Two million powder metal jet compressor engine blades are already in use in Allison J-35s with no material failures reported to date.

And in addition to the Rolls-Royce interest, it's reported that General Electric will use the blades in its J-47s soon, and Wright Aeronautical in its American-built British Sapphire.

Plant Expansion Certificates Issued

Certificates of necessity for accelerated tax amortization of two General Motors plant expansions at Dayton, totaling $9.8 million for propeller and aircraft production topped the list of Defense Production Administration certificates for aviation and avionics military production, recently announced.

Certificate for the propeller plant expansion was for $4,108,230 and the aircraft plant expansion for $5,713,823.

Other aviation and avionics certificates for accelerated amortization listed by DPA:

• **90%**—Buerck Tool Works, Buffalo, aircraft assemblies, $17,517.

• **80%**—Caval Tool & Machine Co., Newington, Conn., aircraft parts, $56,423; Airborne Instruments Laboratory, Inc., Mineola and Hempstead, N. Y., antennas, three certificates, $117,800, $600,000 and $138,380; Air Products, Inc., Emmaus, Pa., oxygen generators, $144,094; Eaton Manufacturing Co., Marshall, Mich., rotor pumps, $882,156; Aero Coupling Corp., Burbank, Calif., aircraft hoselines, $72,230.

• **75%** (In addition to the two GM certificates)—J. P. Stevens & Co., Inc., New York, parachutes, $10,329; International Latex Corp., Dover, Del., parachutes, $2,460,000; Radio Corp. of America, Harrison, N. J., tubes, two certificates, $1,334,849 and $1,544,634.

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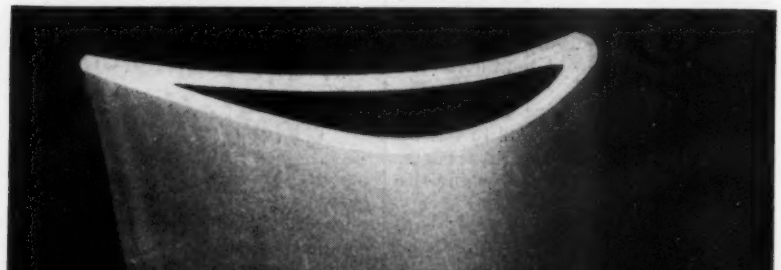
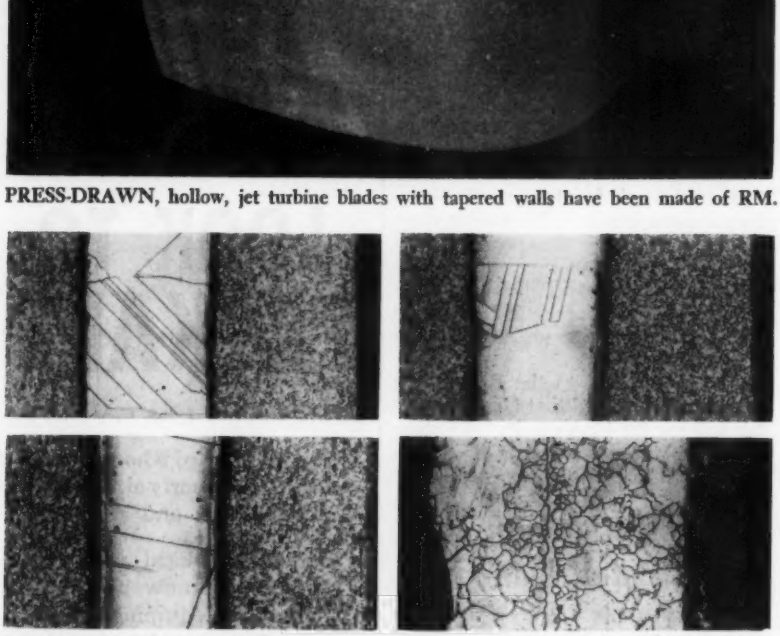


PRESS-DRAWN, hollow, jet turbine blades with tapered walls have been made of RM.



MICROPHOTOS (200 magnifications) of RM being diffusion treated show its resistance to heat breakdown. Upper left, as received; upper right, after 40 hr. at 1,400F; lower left, after 2 hr. at 1,800F; lower right, after 2 hr. at 2,000F.

Sandwich Metal Stands up to Heat

Rosslyn copper-core material has high strength at high temperatures, saves on critical materials.

By George L. Christian

Rosslyn Metal is being used increasingly to help lick high temperature sheet metal problems which plague today's aircraft and engine designers.

Its strength at high temperature—a result of its high heat conductivity—make it admirably suited for such applications as jet engine combustor liners and tailpipes and perhaps also for turbine buckets. For the reciprocating engine, this product of American Cladmetals Co. is being tried as ball socket and collector ring material in exhaust systems, and, on Convairs, it is already giving an excellent account of itself in the form of augmentor tubes.

Still another aeronautical application being tested is brake discs—and the list of aircraft parts which are expected to give better performance or longer life when fabricated from the metal is growing steadily and rapidly according to Joseph Kinney, Jr., president of the Carnegie, Pa., company.

►**Metal Conservations**—Highly desirable feature of Rosslyn Metal as material for defense production is its saving of strategic metals. With the conservation program in full swing, Rosslyn Metal shows significant economies of such hard-to-get elements as columbium, cobalt, nickel, chromium and tungsten. Here are typical examples of how the metal saves without weight sacrifice.

Comparison of composition of Inconel type sheet .045 in. thick, Inconel Rosslyn Metal counterpart, and Rosslyn Metal type 321 stainless grade:

	INCONEL	RM INCONEL	321 RM
Nickel	78.5%	55.7%	5.6%
Copper	0.2	29.1	29.1
Chromium ..	14.0	9.9	12.6
Manganese .	0.25	0.17	...
Other elements chiefly iron	6.5	4.6	52.7

A similar comparison for cobalt-nickel-chromium alloy sheet reveals:

	STANDARD ALLOY	ROSSLYN METAL (TYPE 19/9 DL)
Nickel	18.0%	6.3%
Copper	0.0	30.5
Chromium ..	18.0	13.3
Manganese.	...	0.8
Molybdenum	2.7	0.9
Columbium.	0.7	0.4
Tungsten ..	2.0	1.3
Cobalt	18.0	...
Other elements chiefly iron	43.0	46.7

Kinney expects type 19/9 DL will soon be available without any of the element columbium.

When type 310 stainless is considered, 3 lb. of nickel in 10 are saved. The same saving of columbium is obtainable in type 347.

According to Department of the Interior statistics, 100% of all columbium and 99% of all cobalt used in this country is imported, while the U. S. produces about 70% of its copper consumption.

Rosslyn Metal consists of a copper core sandwiched between outer coverings of various types of stainless steel. The steel gives it strength, the copper conducts heat away from hot spots relieving high stress concentrations and provides vastly improved heat dissipation over that obtainable with stainless steel only, the company states. Metals are joined by "diffusion bonding."

►**Advantages**—Kinney told AVIATION WEEK that Rosslyn Metal, because of these characteristics of great strength and high heat dissipation, was well suited to aeronautical applications. He claimed:

• **Fabrication costs**, time and man hours are often reduced. Stiffeners and support members of aircraft components may often be eliminated with the use of Rosslyn Metal. The better heat distribution as a result of the copper core markedly reduces fatigue failures of sheet metal parts. Lockheed, which has made T-33 and F-80 tailpipes out of the material, has succeeded in eliminating stiffener rings which were incorporated in the original design.

• **Weight is cut.** Although Rosslyn

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New Gilfillan GCA is a challenging, complex production problem. Has over 35,000 intricate, custom-made parts!

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Metal weighs slightly more than stainless (2% more than 321, for instance), components may often be made out of one gauge lighter RM. Also, elimination of support members mentioned above means a weight saving.

• **A life increase** of up to 500% may be expected when RM is substituted for straight stainless because it combats the bugaboo of hot spotting and moderates thermal stresses.

• **Type 321 RM** can be used where temperatures of 800 to 1500F are expected, while type 310 RM has excellent properties up to 1800F.

Although Rosslyn Metal costs about twice as much as straight stainless, Kinney says that consumers feel that the cost is justified because of the many advantages of the metal.

▶ **Latest Uses**—Latest applications of Rosslyn Metal according to Kinney are:

• **Experimental burner can** liners in the Allison J-33-A-35 jet made of Inconel type RM sheet.

• **Westinghouse** is making unrevealed jet engine experiments with type 310 RM.

• **General Electric** is type-testing Rosslyn Metal 321 sheet in J-47 versions. The company is considering RM for use in afterburners.

• **North American Aviation** has reported favorably on type 347 RM for tailpipes for the F-86.

• **Press drawn, hollow blades** of RM with tapered wall thickness have been made experimentally by Turbo Products Corp., Calif.

RM rotor blades are being tested by a government agency on jet turbine wheels, using a lower grade aircraft alloy (type 4130 RM sheet) with no nickel content.

• **Ryan** will make a complete exhaust collector ring system for a reciprocating engine to be ceramic coated for test purposes. It has also made some RM ball and socket joints for C-124 and C-54 exhaust systems.

• **Solar** is testing RM with ceramic coating. Ceramic coating permits use of lower alloy metal because the ceramic protects the metals from the ravages of oxidation.

• **Goodyear** is experimenting with RM as brake material.

• **Rocket motor** applications are in the offing.

Plane Parts Shaker

A shaker designed to meet military requirements for vibration testing of parts is being produced by MB Manufacturing Co., Inc.

The machine develops 2,500-lb. force and is capable of 15G acceleration under a table load of 100 lb. It is built to meet Specification MIL-E-5272 and 41065B.

MB says the unit, Model C-25, features accurate, continuous and easy control both of force and frequency, with electrical interlocks to prevent improper operations. It has a table 20-in. in diameter. The control panel is available with a built-in meter for reading vibration directly in terms of acceleration, velocity and displacement. The machine weighs 4,500 lb. and stands about 3½ ft. high. No special foundation mounting is required.

MB Mfg. Co., Inc., 1060 State St., New Haven 11, Conn.

Nationalist China AF Buys U. S. Lights

U. S. airport lighting equipment is being shipped to the Chinese Nationalist Air Force for installation on Formosan airfields.

Manufactured by various divisions of Westinghouse Electric Corp., the components include 1,400 airport lights of different types, 246 high intensity runway lights of 100,000 candlepower, 652 runway and 516 taxiway medium intensity lights.

Also included in the shipment are 1,800,000-candlepower airport beacons, vertical beam ceiling projectors, obstruction lights with distribution switchboards and lamp bulbs.

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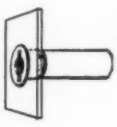
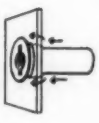
1 Drill one (1) hole.

2 Insert Lok-Skru with either Hand or Power Lok-Skru Tool.



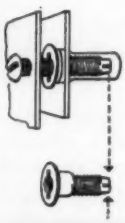
3 With Lok-Skru Tool draw barrel over shoulder of Lok-Skru and flush with metal. This provides a Blind Anchor Nut for Secondary Attachments.



4 TO FASTEN ATTACHMENTS insert standard Machine Screw through hole in attachment and into Lok-Skru.

As machine screw is tightened into Lok-Skru it is securely locked by means of the "Specially Crimped" locking-end of the Lok-Skru.

Crimped internal threads of Lok-Skru provide secure locking device for attachment screw.



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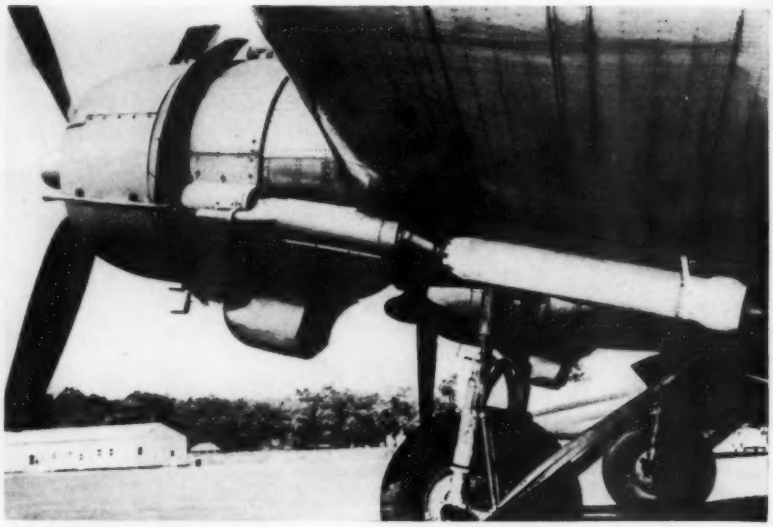


EXHAUST MUFFLER (white tube above) is being redesigned to fit in DC-3 tailpipe.

Muffler Quiets DC-3 Engine Noise

Exhaust mufflers, claimed to cut engine noise by 50-60% and to have negligible effect on performance, have been fitted on a DC-3 and have successfully passed Civil Aeronautics Administration installation requirements.

The muffler, developed by Aero Sonic Corp., Brooklyn, N. Y., is believed by the firm to be the first used on a transport-type aircraft in day-to-day commercial operation. The plane is owned by Meteor Air Transport, a contract cargo carrier operating from Teterboro Air Terminal, N. J.

The muffler was approved, says CAA, under a Repair and Alteration Form 337, applicable only to the specific installation. But engineers of the agency told AVIATION WEEK it likely will be okayed for any Pratt & Whitney R-1830 engine (used in DC-3) when Aero Sonic finalizes on a production model.

►**For Other Transports**—Development of the muffler has been closely followed by CAA for more than a year and evaluation is almost complete. Noise tests have not yet been made by CAA, but the company says trials by New York University's College of Engineering showed the device cut engine noise up to 60%. Last year, CAA approved its use on a P&W 450-hp. Wasp Junior (AVIATION WEEK, Aug. 14, p. 52).

Bob Morrow, Meteor president, says steps are being taken to adapt the Aero Sonic muffler to a C-46 operated by the airline. He believes the unit also could be used successfully on modern transports like the twin-engine Convair without affecting the slight "jet-assist" given by tail pipes.

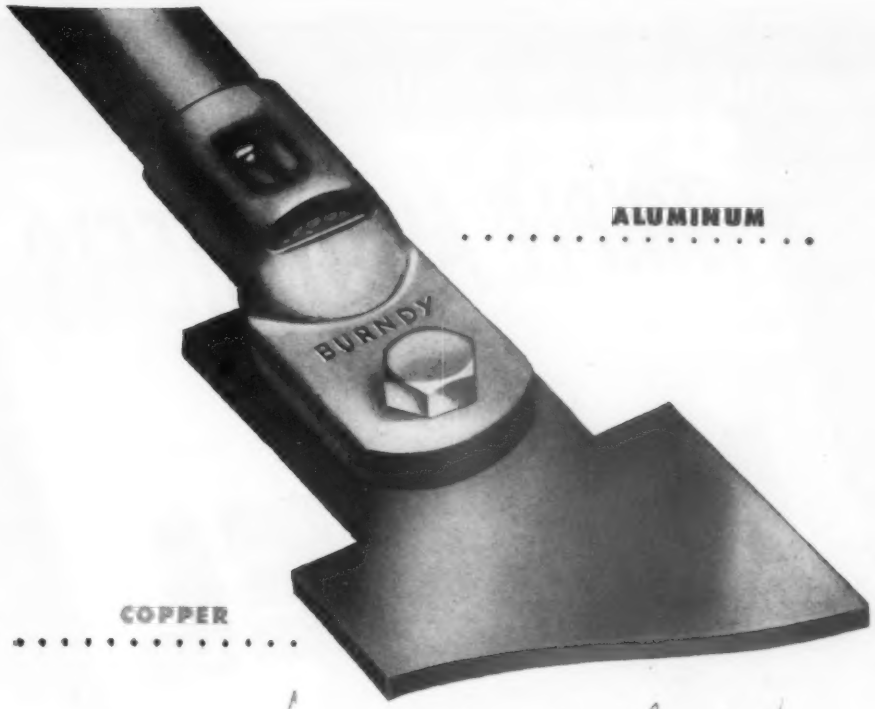
Morrow says the DC-3 seems quieter both to groundlings and passengers. Noise is reduced particularly in the cabin, but the pilot, sitting forward, doesn't notice the difference as much, he says.

►**To Go in Tailpipe**—The muffler pictured above consists of a white tube (right) that extends from the tailpipe and fits under the wing of the DC-3—an external outcropping that many airline engineers might not favor. However, this feature may be shortlived. The muffler is being reworked to fit inside the DC-3 tailpipe so only a 6-in. extension will be required. Aero Sonic predicts it will perform about the same with this new arrangement. The final installation, for both engines, is expected to weigh 30 lb.

The DC-3 tests, under CAA checks, indicated the muffler created no excessive back pressures or high head temperatures under severe engine operating conditions. The unit also stood up well in normal service with the plane on cargo flights. Tests included operation at the DC-3's redlined speed of 255 mph. and 32 min. running on a single engine with maximum permissible climb power. Manometer checks to determine back pressure showed virtually no difference from that caused by the standard exhaust manifold, says Aero Sonic.

►**No Backfire**—Built entirely of stainless steel, the muffler essentially is a tube within a tube with a Venturi-shaped tailpipe to induce jet action in scavenging chamber. Tubes have thousands of perforations.

Danger of back-fire has been eliminated, the firm says, by use of a vent which draws in fresh air through a small, funnel-shaped scoop projecting forward of the new exhaust muffler into the airstream.



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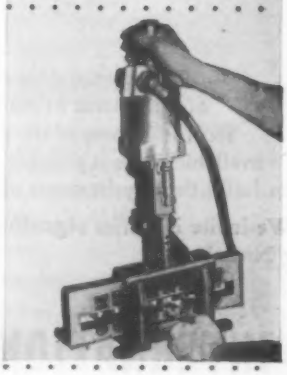

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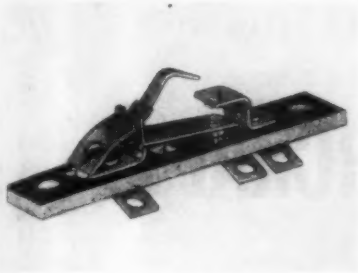

Snap-Action Switch

New snap-action switches, featuring simplicity and straightforward design, have been developed by Cherry-Chalmer Corp. with an eye on offering cost savings to equipment manufacturers.

The switches are said to be suitable for aircraft applications. To keep price down, they are stripped of all but the barest essentials, says the maker. They employ over-center coil spring construction. This permits models to be supplied through a wide range of actuating pressures simply by using a spring of the proper characteristics for the job specified.

The units are mounted on Bakelite panels, have bracket and actuator materials of brass, blades of phosphor bronze and silver contacts. One model has a release force of 5.5 oz. and requires an operating force of 7.5 oz. Another has a release force of 2.7 oz. and operating force of 4 oz. These switches are rated at 6 amp., 125v. a.c. and 3 amp., 250v. a.c. respectively.

Cherry-Chalmer Corp., 1488 Skokie Blvd., Highland Park, Ill.

Avionic Varnish

A special varnish which raises the high-temperature resistance of solenoids used on jet engines reportedly has been developed by Jack & Heintz.

The thermo-setting plastic varnish eliminates the bulky insulation normally required on solenoids which must operate under high temperature conditions, says J & H. It also resists salt-spray and fungus and is suitable for application in various electrical components.

The product was developed for the firm's JH 2800 solenoid. This unit has operated at temperature up to 600F, the company says. It is rated for a life of 100 hr. at 500F, but also is suitable for temperatures as low as −67F. At lower temperatures, life is increased, the firm says.

Jack & Heintz, Inc., 17600 Broadway, Cleveland 1.

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FINANCIAL

Stock Options Offered to Key Men

Aviation companies join trend toward share-purchase plans as incentive to top management personnel.

Stock options as management compensation are becoming more widespread among aviation companies. This is in keeping with recent trends in general industrial practice. Real impetus to this policy resulted from the special tax treatment written into the Revenue Act of 1950 enacted by Congress last year.

In order to provide greater incentive to management, this special tax provision permitted officers to buy shares in their own companies under favorable circumstances. With prevailing heavy income taxes, the receipt of large salaries frequently failed to afford adequate net compensation, according to many officials.

▶**Lightens Tax**—Under the approved stock option form, a device is available permitting option recipients to acquire a considerable stake in their companies. As a practical matter, these options are applied as instruments to achieve capital gains and as such are not subject to heavy income tax imposts.

To qualify for this special treatment, the option price must be at least 95% of the market at the time the option is granted. If the option price is 85 to 95% of the market price at the time it is granted, the difference between option and market price is taxed at the full income rate (but not until the stock is sold); and any additional profit above the market price at the time of the option is granted is taxed at capital gains rates.

Other limitations stipulate that stock cannot be sold for at least two years after the option is granted and must be held for at least six months after the option is exercised in order to establish a capital gain.

Thus far, aircraft companies have been quick to grant stock options to management; airlines have been slower to act.

▶**Top Men Favored**—A common characteristic of most aircraft company option plans is their tendency to become heavily weighted in favor of top management.

• **Douglas.** For example, earlier this year, Douglas Aircraft Co. granted options on 30,000 shares to its key officials. Of this amount, options on 20,000 shares were awarded the president. Seven other officials are to share in the remaining options on 10,000 shares. These options have been automatically adjusted to a call on a total of 60,000 shares as a result of the two-for-one stock split declared by the company. The options are good for five years and are exercisable at 95% of the market price of the stock at the time of the granting of the options.

• **United.** United Aircraft Corp. awarded options on 100,000 shares of its common stock to approximately 20 of its officials. The individual allocations have not been indicated. It is contemplated that these options will be exercisable over a period not to exceed 10 years and at 95% of the market price when granted.

• **Sperry.** Sperry Corp. authorized the issuance of options on 200,000 shares to not more than 35 key officials. In this instance, the options will also run for ten years and are exercisable at 95% of the market price of the stock when awarded.

• **Thompson Products, Inc.** was authorized to place 75,000 shares of its common stock under option to key officials. On April 12, the company reported that options on 53,850 shares were allocated to 33 officers at 95% of the closing price of the stock that day.

• **Eastern.** Eastern Air Lines was the first air carrier to make options available to its organization under the Revenue Act of 1950. Eastern's plan is unique in that stock options were offered to all employes who had been in the service of the company for three years or longer. Almost 100,000 shares were thus placed under option to about 4,000 employes. No director, including the president of the company, was permitted to participate in this particular plan. The purchase price was established at $13.50 per share or 85% of the highest sales price established on the N. Y. Stock Exchange on Nov. 10, 1950, when these options were awarded. The plan is also unusual in that it is one of the very few anywhere which provides for payment through regular payroll deductions by employes of the organization.

• **Western Air Lines, Inc.** also received stockholder authorization to award options on 35,000 shares of its stock to key officials at 95% of the market price for a period not to exceed five years. A previous option now affords the president of Western with a call on 25,000 shares of stock at $9.375 per share up to Dec. 31, 1951.

▶**Earlier Plans**—Stock options to management are not foreign to the aviation group and found frequent application in many forms prior to the Revenue Act of 1950.

• **Convair.** For example, some 33,000 shares of Convair's common stock was optioned to nine of its executive officers on Jan. 28, 1950, at $10.50 per share. This stock is being acquired through a purchase plan with indebtedness to the company in the form of non-interest bearing notes.

• **Republic.** Republic Aviation Corp. granted six of its top officers the right to purchase a total of 11,000 shares of its stock at an average price of $8.7865 per share. This was started in June, 1950, and payments by these officers are scheduled to be made over a five-year period.

• **American.** American Airlines, in June, 1945, awarded its chief executive officer an option which was ultimately adjusted through stock-splits as a call on 250,000 shares of common at $11.70 per share. This particular option expired on June 1, 1950. In its place, new options on 250,000 shares of common stock were authorized to a limited number of executives at not less than $11.70 per share up to June 1, 1955. At Dec. 31, 1950 the company reported that options on 143,000 shares at $11.70 per share were awarded to 30 of its executives.

Significantly, American's plan to award a broader group of its key people options under the Revenue Act of 1950 is awaiting a determination by the Wage Stabilization Board which is to ascertain whether all of these proposals are not in effect additional compensation.

It is this same factor which may determine the wider utilization of stock options to key aviation officials by their respective managements.

The option device to make stock available to officials on advantageous terms is well-established in American corporate practice. Applied within the confines of reasonableness, the principle has led to progressive management policies and benefited the companies involved. This has been a proven element in the successful management performance of General Motors, General Electric, and other leading corporations. On the other hand, criticism has frequently been directed at the application of options on a too liberal basis and out of proportion to the success attained by officials for their companies. Owner-management as encouraged through the option route, but where possible keyed to tangible results, is constructive to the long-range progress of the company involved.

—Selig Altschul

AIR TRANSPORT

New Stall Rule Hit As 'Arbitrary'

Industry likes proposed CAB Safety Regulation, except provision for sharp warning 7% above stall speed.

By F. Lee Moore

Transport aircraft manufacturers and airlines this week are trying to get CAA to remove an "arbitrary" stall warning requirement which has been established for transport planes.

They contend the CAA-suggested requirement of a sharp stall warning "not less than 7% above stall speed" is the only fault in a new proposed CAB safety regulation on stall characteristics for transports.

On all other points of the new proposed stall characteristics, the plane designers, airlines, pilots and CAA agree.

Planes up for stall test for type certification now are Martin 4-0-4, Convair-Liner 340 and Lockheed Super Constellation. Lockheed may be the first to make stall-characteristic tests under the proposed regulation.

But on the stall warning, the industry wants a qualitative evaluation of stall warning adequacy, not a flat figure written into law. They say the requirement of a sharp stall warning at "not less than 7% about stall speed" means that almost all modern planes would have to have artificial stall warning indicators—none of which the industry considers to be wholly adequate for the purpose.

If that problem is ironed out the industry expects the newly proposed stall performance regulation to:

• **End the risk** of testing each new transport for CAA certification. Under recent CAA interpretation of the present stall regulation, flight test crew has had to fly the plane into a deeply stalled condition, which no pilot would have occasion to do in actual flying. This deep-stall testing is risky to life of the crew and also dangerous to the costly new plane.

• **Cut months** off testing time for type certification, saving up to an estimated certification which would result in the saving up to an estimated half million dollars per plane.

• **Allow removal of spoilers** from such planes as the Boeing Stratocruiser and Douglas DC-6B. Recent CAA interpretation of the old regulation required spoilers on these planes, even though the spoilers detract from normal handling characteristics in landing the planes.

▶ **Regulation Changes**—There are three stall characteristic sections in the Civil Air Regulations: Part 4B.160 on stalling with both engines operative; 4B.161 on stalling with one engine out; and 4B.162 on stall warning. Here are the main changes in these sections which have been proposed by CAB Safety Bureau.

New test procedure in 4B.160 would no longer require flying into deep stall. This procedure left the plane shuddering dangerously, losing altitude fast and ready to roll off violently one way or the other. Reports are that a Constellation crew was once almost lost on this certification test when the deeply stalled plane finally whipped into a flat spin.

EASTERN AIR LINES' NEW MIAMI PASSENGER TERMINAL

EAL expects to start using its own $350,000 Miami passenger terminal by Nov. 1. Eastern's new terminal will have the "longest single airline ticket counter in the world," the company claims. Carrier's Miami passenger-handling capacity will be doubled by the new facility, fitting in with the company's $100-million equipment expansion program, which has been recently announced.

The new stall test requirement wording is: "Elevator control shall be applied at a rate such that the airplane speed reduction does not exceed one mile per hour per second until the airplane is stalled, or if the airplane is not stalled, until the control reaches the stop."

The word "stall" is defined. "The airplane shall be considered stalled when, at an angle of attack measurably greater than that of maximum lift, the inherent flight characteristics give a clear indication to the pilot that the airplane is stalled. Note: A nose-down pitch or a roll, which cannot be readily arrested, are typical indications that the airplane is stalled. Other indications . . . may be acceptable if found in a particular case to be sufficiently clear.

"Recovery from the stall shall be effected by normal recovery techniques, starting as soon as the airplane is stalled."

The key change throughout this section of the revised regulation is substitution of the word "stall" for the former definition—"pitching motion."

There is no change in the section 4B.161 on stalling with asymmetrical power.

▶ **Protested Clause**—The stall warning clause 4B.162 is the one the manufacturers protest. It says "clear and distinctive stall warning shall be apparent to the pilot beginning at a speed not less than 7% above the stalling speed."

The plane designers say that the 7% figure written into regulation is too arbitrary. They say you can design a plane and have it turn out safe, but not provide clear stall warning until perhaps 6% above stall speed. Or the plane might give some stall warning at 10% above, but not a "clear and distinctive" one until say 6% above stall speed.

Since they cannot design a pre-calculated time of aerodynamic stall warning into a plane, the designers say the CAA-proposed 7% figure in the CAB Safety Regulation Bureau regulation revision will force installation of artificial stall warning devices on modern transports. These devices are not dependable under all normal flight conditions, the designers say.

Here is the wording of the stall warning clause the aircraft industry asked CAB to adopt:

"Sufficiently clear and distinctive stall warning shall be apparent to the pilot with adequate margin to prevent inadvertent flight into the stalled region with flaps and landing gear in all normally used positions. . . ." At the recent annual review of Civil Air Regulations, the CAA-proposed stall warning at 5 to 10% above stall; Air Transport Assn. backed the aircraft industry on its wording; and the Air Line Pilots Assn. stipulated 7 to 12% above stall.

IATA Will Study Atlantic Air Coach

This week Pan American and Trans World Airlines will try to persuade other trans-Atlantic air carriers to start low-fare air coach services to Europe next summer. International Air Transport Assn. conference on this question starts today, Sept. 17.

The two American carriers, backed by Civil Aeronautics Board, will urge IATA members to sign an agreement permitting unlimited air coach operations across the Atlantic. They will point out that this coach fare would be no give-away: air coach planes must carry more passenger seats, so the yield per fully loaded flight would be the same or better; and number of flights would be more, as economic studies show lower fares vastly expand potential market.

Pan American will say that it looks toward "tripling the present annual trans-Atlantic air business" by air coach service.

Trans-Atlantic air coach was agreed to in principle at the IATA conference in May at Bermuda. But CAB rejected the agreement (AVIATION WEEK Aug. 13, p. 17).

The CAB rejection of the air coach clause in the May agreement voided the standard and winter tourist fare agreements, too. So the carriers recently re-validated those separately, minus the one feature.

PanAm this time rejected the low mid-winter excursion rate; that has provided a standard 17-day roundtrip between January and March at only 110% of standard one-way fare. PanAm says it rejected this old pet project of Trans World for the following reasons:

- It failed to do anything for tourists in the seasons when they really want to travel—mostly mid-summer.
- It diverted traffic from regular mid-winter travel by giving the same service at lower fare.
- It did not promote high-density travel in mid-winter.
- It therefore ran at a loss.

Trans World Airlines is backing PanAm on year-round trans-Atlantic air coach starting next summer. Said TWA Board Chairman Warren Lee Pierson in turning over the IATA chairmanship to BOAC Chairman Sir Miles Thomas: "Cost studies by the industry have recently indicated . . . that tourist fares on high density airplanes can be made to pay their own way."

The British government is known to favor a quick start of trans-Atlantic air coach because it would bring more tourist dollars to England. Other governments may feel the same, but no one last week was willing to go on record with a prediction as to whether the foreign carriers would accept the PanAm-TWA proposal for unlimited number of air coach flights. All carriers must agree, or the motion dies, according to IATA procedural rules.

Plane Makers Upheld On Safety Measures

A public implication that aircraft manufacturers sometimes compromise safety in favor of economics and competition in transport design drew strong press reaction last week in the U. S. and Britain.

The "accusation" quoted by the press was from Jerome Lederer, Director of the Guggenheim Aviation Safety Center at Cornell University, speaking to the Royal Aeronautical Society at its third Anglo-American Aeronautical Conference at Brighton, England.

► **Rebuttal to AP**—After reading the Associated Press dispatch from Brighton quoting extracts from Lederer's dissertation, the president of U. S. Aircraft Industries Assn., Admiral D. C. Ramsey wrote the Associated Press: "Mr. Lederer's statement is completely unsupportable by facts, and must be categorically denied. I can safely say that no American aircraft manufacturer ever has knowingly sacrificed safety in transport airplanes to any other consideration whatever." Ramsey also pointed out that of the seven fatal accidents last year, less than one-third were due to structural failure.

Actually, Lederer's remarks on Safety vs. economics were quoted out of context in the press. The conclusion of Lederer's 44-page paper only urges that "the ethical, financial and personal significance of safety should be brought to the attention of student aeronautical engineers early and throughout their college courses. . . . [and] that he be instructed in human engineering . . . a substantial reduction of the overall accident potential should result, adding impetus to the drive for making flight the safest form of transport."

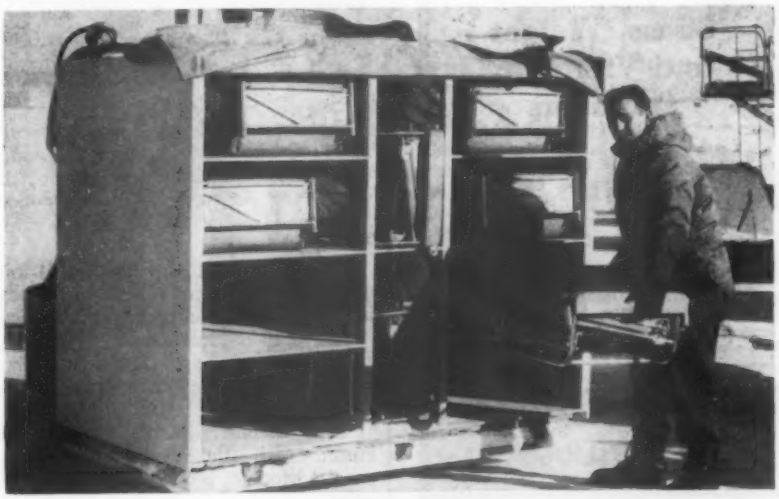
► **Quote from Lederer**—Most quoted remark of Lederer's paper is the second and third sentence of the following five: ". . . Many engineers continue to look upon safety with indifference or as a subject that should be considered at some later stage in the design of aircraft. This callous attitude towards safety is often influenced and supported by the pressure of economics. . . . The pressure of competition can also be an important factor in defeating the aims of safety. The sale of civilian aircraft is on the basis of pay load, range, speed, passenger comfort and the more obvious sales appeals. But safety is incapable of numerical or sensory evaluation and therefore is difficult to sell from a competitive standpoint."

Lederer's next statement indicates the previous quotation is more discussion than condemnation: "Offsetting these shadowy aspects of air safety are two strong trends in the opposite direction.

"The first is that there is a growing recognition in the aviation industry that air safety and reliability do have economic values which can no longer be overlooked. . . .

"The second favorable trend is the widespread acceptance in college circles that safety should be integrated into all engineering courses."

The more controversial remarks in



SEAT STORER

This storage rack is used to hold seats removed from Pan American World Airways Alaska division's freight aircraft when cargo displaces passengers. Designed by mechanic John Vacura, the entire rack is hoisted to aircraft door level for handy loading or unloading. Canvas is to protect seats when stored on the ramp.

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Lederer's paper have appeared under his name in substantially the same form, including a paper he delivered to the S.A.E. this January (AVIATION WEEK, Feb. 12, p. 28).

Wiggins Asks for Copter Service

The New England local service airline, Wiggins Airways, has asked CAB permission to work toward an all-helicopter operation, if CAB will renew Wiggins' certificate to operate at all.

President Joseph Garside states the Wiggins plan for New England air service this way:

- **Place DC-3s in service** immediately where traffic justifies them.
- **Put single-engine copters** in service at some other points at the same time, carrying mail and cargo only at the beginning.
- **Switch to an all-copter** operation as soon as multi-engine copters become available.

Wiggins would like to bring copter service to every city and town in New England with enough traffic potential. The line has operated a copter over 90,000 miles the last two years.

Says Garside: "The issue in the Wiggins Airways certificate . . . is not so much whether Wiggins (should continue) . . . But rather whether New England is to continue to have a real local air service at all. . . . New England, perhaps more than any other section of the country, requires air service of a local character."

CAB Hits 'Regular' Modern Air Transport

Civil Aeronautics Board has refused to let nonsked Modern Air Transport continue to operate as a large irregular carrier.

CAB said Modern's operations, primarily New York-Puerto Rico and Miami-Puerto Rico, "were conducted with a regularity and frequency not authorized under the Board's exemption regulations."

CAB went on to say "Modern's unauthorized operations were conscious and deliberate" and that the Board "must find Modern not sufficiently trustworthy to be entrusted with an exemption to engage in irregular transportation."

CAB member Joseph Adams concurred with the Board's judgment against Modern, but dissented from the opinion.

A May 25, 1950, CAB opinion stated that the Board would deny applications of all large irregular carriers who have been operating route-type operations. In a CAB enforcement case, the Circuit

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Court of Appeals had already ruled that Modern was operating route-type services.

Adams contends that when the CAB hearing on Modern came up, the result was already a foregone conclusion because of the court ruling.

But CAB majority says the hearing was not solely to decide whether Modern operated a route-type service. If a carrier had in the past done this, but has since ceased, then CAB may approve the carrier.

CCA to Use 5 2-0-2s Obtained from NWA

California Central Airlines this month is replacing its entire DC-4 and DC-3 fleet with Martin 2-0-2s recently bought from Northwest Airlines. The intrastate airline says the 2-0-2 will enable CCA to offer "the fastest schedule of any airline flying between the four California coast cities."

Cal Central is fitting its five Martins with 44 passenger seats, two lounges, air-to-ground telephone. Company is completing modifications "to meet the latest safety requirements." Flight crews have finished training for the 2-0-2, with more than the number of hours required by regulations.

Other carriers now operating Martin 2-0-2s are Trans World, Linea Aeropostal Venezolana (LAV) and Linea Aerea Nacional (LAN).

Cal Central presently schedules four flights between Los Angeles-Burbank and San Francisco-Oakland and three flights between Los Angeles-Burbank and San Diego—daily round trips. The San Francisco-Los Angeles service will be increased to ten flights on Fridays and Sundays. The desert route to Muroc and Inyokern will continue at two roundtrip flights daily.

Navy Gives Push to Turboprop Transports

U. S. Navy sponsorship of two four-engine turboprop transport conversions, confirmed last week, moved the era of turbine-powered U.S. air transport a long step closer to commercial reality.

Navy confirmed letters of intent to Douglas and Lockheed for Phase 1 engineering of turboprop-powered DC-6A and L-1049 transports.

The Phase 1 contract commits money for design engineering only. But this is a normal preliminary procedure. Observers say development of the turboprop prototypes will go ahead steadily.

The timing of the Navy contract also indicates that fast turboprop-powered transports are now considered practical and will shortly become economical. Reports are that although con-

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trol difficulties may still crop up on the Consolidated R3Y flying boat, these are probably connected with its special electronic controls. On their turboprop DC-6A and L-1049, Douglas and Lockheed are reportedly planning more conventional turbine-propeller controls—not the R3Y electronic prop control.

Flight Attendants Hit Accommodations

Five flight attendants left a Pan American World Airways Boeing Stratocruiser at N. Y. International Airport just prior to takeoff for London on Sept. 14 in protest against two of them having been assigned to sit in the plane's lower deck lounge while not on duty.

A spokesman for the Transport Workers Union (CIO) stated that the personnel felt that the accommodations were hazardous, particularly during landings and takeoffs in event of sudden emergencies, and that it had advised its members that the union would back any member who left the plane if assigned to this area against his wish.

A Pan American Airways official pointed out that the Stratocruiser is certificated by CAA to permit seating in the lounge during takeoff and landing and that these seats were assigned the flight attendants because passengers occupied all the main cabin seats.

Two flight attendants walked off a Stratocruiser in London about a week before for the same reason. In both cases, PAA administrative personnel took the vacant posts and the flights left on schedule.

SHORTLINES

► **Air India International**—Overseas branch of India's airline reports increased profits in 1950, more than one-third over year before, to $5 million. Operating Bombay to London and Nairobi, company ran over 200 round-trips—75 more than a year ago. Half of profits go into government indemnity account, other half into a reserve.

► **American Airlines**—Carrier will increase air cargo schedules to and from Los Angeles by 50% by year's end. AA cargo director J. D. Boylan says Los Angeles exports to the east can enable "the airline to maintain a reasonable balance factor in west-east shipments despite the great volume from production centers of the east." AA's present schedules give 150,000 lb. daily air cargo capacity out of Los Angeles. . . . American has granted pilots an extra $2.50 an hour for Pacific Airlift flying.

► **British Overseas Airways Corp.**—Car-

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rier has signed an air-sea roundtrip fares and booking agreement with Farrell Lines giving passenger roundtrip discount on sea voyage one way, air the other.

▶**Capital Airlines**—Capital earned an operating profit of $442,674 in July and a net after taxes of $207,543. Seven months ended July show operating profit of $1,991,523 and net after taxes of $928,560. Seven-month operating profit is up 115% and net profit up 70% over a year ago.

▶**Civil Aeronautics Board**—CAB appointed Joseph H. Fitzgerald, former CAA regional attorney, to succeed Robert O. Kinsey as director of the CAB Alaska office.

▶**Colonial Airlines**—Flew a record 27,627 passengers in June, 26% over a year ago. Bermuda traffic was up 47%.

▶**Council of Student Travel**—Group has CAB permission to arrange air transport of 600 students from Europe to the U.S. on 10 flights, provided these are by U.S. certificated carriers or holders of foreign air carrier permits. Pan American opposed the council's application.

▶**Flying Tiger Line**—Carrier claims to have moved the largest single air freight shipment hauled by C-46 when it flew four huge Byron-Jackson booster pumps from Burbank, Calif., to Westover Field, Mass. for the U.S. Army Engineers. Each C-46 carried one pump and tow skid weighing 11,000 lb. Additional floor skidding to distribute weight and other equipment brought total load to over 13,500 lb. each.

▶**Frontier Airlines**—Local service airline clips more than 1 hr. 10 min. from flight time between Salt Lake City and Albuquerque following recent Civil Aeronautics Board approval of schedule changes.

▶**International Air Transport Assn.**—IATA has taken on a new active member—Divisao de Exploracao dos Transportes Aereos (DTA), of Luanda, Angola, Portuguese West Africa. DTA is a companion company to DETA, operating out of Lourenco Marques, Mozambique—also an IATA member. . . . Meanwhile two Greek airline IATA members have amalgamated—Greek Airlines (TAE) and Hellenic Airlines (Hellas)—to become National Greek Airlines (TAE). Total IATA membership is 62 companies; 58 are active, four are associate members.

▶**KLM Royal Dutch Airlines**—KLM has signed an air-sea agreement with

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▶ **Mid-Continent Airlines**—MCA is promoting air travel by "first riders" in ten cities by pushing a $6.75 flight 105 miles from Bismarck to Minot, N. D., as a test to "prove to yourself that air travel is best."

▶ **Northwest Airlines**—CAB says probable cause of the Mar. 18 DC-4 landing in heavy snow beside the runway at Minneapolis, damaging the plane but hurting no one, was poor visibility and the partial snow coverage of runway and runway lights, causing failure of the pilot to align the plane with the runway.

▶ **Pan American World Airways**—CAB show-cause order would have PAA refund $5,788,000 to the government under proposed final mail rate on its Pacific Division for the five years to Dec. 31, 1950. CAB says military contract earnings should be included in an airline's revenue for CAB purposes of determining fair return on investment for subsidized airlines. CAB says a major purpose of subsidy mail pay has been development of a civil air arm for national emergency.

▶ **Sabena Belgian Airlines**—Carrier plans a rail line connecting the Brussels railroad terminal with the International Airport, reducing passenger time between them from present 25 min. by bus to 15 min. by the rail spur. . . . Sabena next month opens a new airline between Costermansville, Lake Kivu, Belgian Congo and Dar-es-Slaam, Tanganyika. Sabena operates in the Belgian Congo "the longest colonial network in the world—12,500 miles."

▶ **Scandinavian Airlines System**—SAS is offering all-inclusive 17-day air tours to the Olympic Games in Oslo Feb. 14-25 next year. DC-6 tour from New York with all expenses, including room, tips, admission to all 50 events, and meals, starts at $650.

▶ **Transocean Air Lines**—TAL has a six months' extension of its Navy contract giving linehaul and bush flying service in the Arctic Circle.

▶ **Trans World Airlines**—CAB says probable cause of the TWA Constellation wheels-up landing at Phoenix, Ariz., Mar. 19 was pilot failure to push the landing gear lever full down and check its position there before landing. No one was hurt, but the Connie was substantially damaged. . . . TWA plans to build a $2-million hangar and other shop, office and gasoline storage at Midway Airport, Chicago. Completion is planned by October, 1952.

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814	35814	Blower Ass'y
22	36759	Rod Ass'y
182	46400E	Liner
30	48346	Cylinder
53	48362	Shaft
175	48363	Shaft
56	48392	Sump
390	48461	Gear
78	76236	Gear
1178	84289	Bearing
113	84487	Housing
77	84591C	Nose Housing
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233	D9530	Adel
428	D9560-2	Adel
744	D10044	Adel
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88	572-3A	Eclipse
244	D10051	Adel

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700	TFD 8600	Thompson	Fuel Booster
125	D7818	Adel	Anti-icer
170	2P771-A	Pesco	Fuel Booster
250	AN4014	Erie Meter	Wobble (D-3)
300	1H260-K & KA	Pesco	Hydraulic

INSTRUMENTS

22	AN5531-1	G. E.	Tach. Generator
1000	AN5780-2	G. E.	Wheel & Flap Position Indicator
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1000	AW2-65B	U. S. Gauge	Air Pressure Gauge
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10	46B9	Lewis Eng.	Air Temp. Ind.
31	47B21	Lewis Eng.	Temperature Ind.
12	47B22	Lewis Eng.	Temperature Ind.
20	47B23	Lewis Eng.	Temperature Ind.
36	47B24	Lewis Eng.	Temperature Ind.
10	76Z2	Lewis Eng.	Air Temp. Ind.
11	76B4	Lewis Eng.	Temperature Ind.
20	77C4	Lewis Eng.	Temperature Ind.
21	77C5	Lewis Eng.	Temperature Ind.
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88	727TY73Z2	Weston	Right Wing Anti-icing
83	727TY74Z2	Weston	Tail Anti-icing
11	2227-11D-2A	Eclipse	Dual Tachometer
22	8DJ-29-AAY	G. E.	Indicator (Cowl Flap)
45	2548K-6-052	Kollsman	Differential Pressure Ga.
25	906-6-011	Kollsman	Dual Altimeter and Differential Pressure Ga.
8	14601-1G-B1	Eclipse	Attitude Gyro
22	15100-1B	Eclipse	Pitch Trim Ind.
10	20000-8A-14	Eclipse	Magnasyn Position Ind.
23	20100-11C-4-A1	Eclipse	Magnasyn Wing Flap Ind.
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25	46N2	Jaeger	24 Hour Clock

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8	FA122	Wallace & Tiernan	Flasher
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85	12924-2	Adel	Lock Valve
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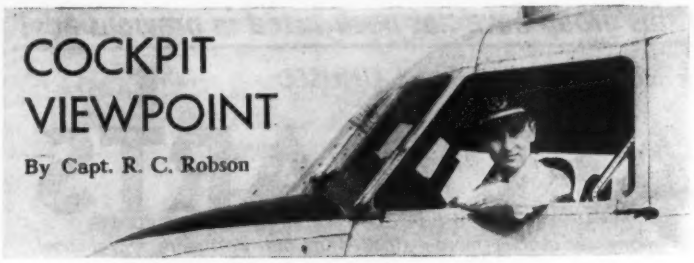
COCKPIT VIEWPOINT

By Capt. R. C. Robson



New Cockpit Philosophy

Occasionally some phase of aviation undergoes a revision because of a change in philosophy—a new way of looking at an old problem. The business of flying an air transport is presently in such a state of change.

Basically it is a re-evaluation of the various tasks performed in a cockpit and a re-assignment of manpower to handle them. The new concept delegates the manipulation of flight controls to the co-pilot whenever possible. The captain assumes all other duties. Appearing radical at first glance, this procedure has developed logically, has sound fundamentals and it works.

▶ **Splitting the Work**—The tremendous work load in modern cockpits has demanded some change. The only tenable position was to assign planning and overseeing the top priority and consider the manipulation of flight controls a secondary function. By examining this arrangement during one of the most critical flying operations, final approach in bad weather, an idea of its worth can be obtained.

During the low approach there is, in addition to power control, the reception and evaluation of navigational information, direction of the airplane to conform with established procedures, weather analysis, and at least a cursory interest in traffic. Under such conditions one man cannot do all. By freeing the co-pilot of all duties, other than flying:

- A more accurate job of flying is obtained.
- The captain is freed of the intense concentration required to manipulate the flight controls and is available for "overseeing." (It has always been true that the pilot NOT on the controls is more relaxed and in a position to observe more details.)
- The "chain of command" is now in logical order. The captain is not hesitant about making suggestions or corrections and is in a position to make better decision. Under the old system of the captain doing all the flying, the co-pilot was put in the undesirable position of deciding when, or whether, to "put in his two cents."
- When the plane becomes contact the captain becomes the "outside" man. That is, he concentrates on seeing the runway, establishes his position and then takes over to make the landing. This eliminates the always ticklish transition from instrument to visual flying.

It is doubtful if any hard and fast rules could be laid down at present along this line. Indeed it is not desirable. Differences will occur according to individual tastes, to meet various situations, for maintenance of proficiency and in order to meet the peculiarities of certain cockpits.

Beyond a simple change in cockpit tactics these new concepts may have an effect on various aviation devices. Cockpit instrumentation, radio equipment and various other controls may eventually need relocating. Ground installations, such as runway and approach lights, runway markings, etc., should also be viewed in their relation to the new procedures.

These various points have been made considering a fully trained, two-man crew. The addition of a flight engineer or an automatic pilot increases safety and reduces the per capita burden.

▶ **Modern Flight Complex**—The complexities of modern flight are more than ever emphasizing the need for relief from tiring, menial tasks, to free at least one pilot to carry on necessary thought problems. When jets come into use a third man will probably be indispensable. This will be true regardless of the reduction in number of instruments and controls. Speed/time is the deciding factor.

During portions of each flight there is, of course, little need for more than one pilot. Aviation, however, like national defense, must be geared for the maximum, or worst, conditions, or it is doomed to failure. Since this new cockpit philosophy increases crew efficiency it is apparently here to stay.

WHAT'S NEW

New Books

Gas Turbines and Jet Propulsion (Fifth Edition), by G. Geoffrey Smith. Published in the U. S. by Aircraft Books, Inc., 370 Lexington Ave., New York 17. Price $7.50.

Aircraft engineers on both sides of the Atlantic will remember the late G. Geoffrey Smith for this edition—and the four preceding ones—of his pioneering technical book. When the first edition was published in 1942, gas turbine technology was still half-witchcraft. Smith's little, 56-page volume spoke lucidly and at length about these wonderful new engines and dipped into their future by starry-eyed predictions.

And now, nine years later, the fifth edition tells of the ever-expanding industry born during those early years—and in this edition, 400 pages and 355 illustrations were required.

These pages reflect the amazing growth of the aircraft gas turbine industry and its slow conversion from art to science. All of the early history is here, the stories of the planes, the engines and the men who made the gas turbine a workable engine.

This book is both technical and readable; it contains enough theory to give the engineer a basis for understanding the way the engines work. It gives the lay reader pictures and schematic diagrams to aid his understanding.

So it fits, and belongs, on any engineer's bookshelf—where it will probably join all four previous editions. And like them, it will in time become dog-eared, worn and well-thumbed.—DAA

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LETTERS

Sabena's Contribution

Another item about the United Nations Pacific Airlift which appeared in AVIATION WEEK July 9 has given me another "nervous breakdown."

With the possible exception of Canadian Pacific, which may be chartering its planes to the Canadian government, I believe that Sabena has the only group of transports which are being furnished by a government which is a member of the UN. Our planes are not leased or chartered to MATS. They operate by liaison with MATS, following instructions by MATS, but they are paid for by the Belgian government.

We have tried to keep three DC-4 transports operating in the Pacific Airlift and have been fairly successful, although the crews which are furnished by Sabena have been flying these planes 175 hours a month. The first plane, which went into service the first week of August, 1950, just returned to the Pacific from overhaul after completing 32 crossings of the Pacific before they sent it back to Brussels for overhaul. The Sabena planes chartered by and paid for by the Belgian government received a citation from Admiral John P. Whitney, vice commander of MATS, for the high efficiency of their service.

I am sort of hoping that before the Korean War ends, I will be able to get across the fact that Sabena is not just another contractor with MATS getting a slice of the American taxpayer's dollars.

GEORGE HERRICK
Director of Public Relations
Sabena
422 Madison Ave.
New York 17.

Youngstown Airport

Reference is made here to AVIATION WEEK for Aug. 13, 1951, page 8. This airport has not been taken over by Air Defense Command but the Air Force has leased a portion of our field and is in the process of constructing a military installation necessary to the housing, administration and operation of a fighter interceptor squadron.

The Air Force has a joint-use contract with the City of Youngstown which provides for rental payment to the city and includes certain items of construction and maintenance which the Air Force is to perform. This contract also provides that the present civil operation will not be affected by military activity, and leaves the control and administration of the airport (except for the actual Air Force cantonment area) in the hands of civil authorities.

KENNETH G. GRANGER, Airport Manager
Municipal Airport
Youngstown, Ohio

From Mexico

We read with great interest your July 2 article by John Wilhelm regarding Mexican aviation, but felt a bit deflated when it was discovered that you only mention those airlines which have control, direct or indirect, from the United States. I am attaching hereto a general schedule which will give you some idea of the air operations in Mexico other than those referred to in your article.

LEO J. DORNEY, Technical Consultant
Aero Transportes, S.A.
Ejido No. 7 A
Mexico, D.F.

Where Canaries Sing

I wanted to write you regarding the recent move of our complete operations from the purlieus of New York City to the delightful environs of Danbury. This move has given all of us who were associated with the company in New York a new lease on life; we have a splendid group of people to work with, we hear wild canaries singing in the trees just outside our office as we arrive in the morning, and we feel like a part of a growing and thriving community instead of being just another traffic obstacle as we were in New York.

We are wondering if you could give our move some sort of play in an early issue of AVIATION WEEK, which we (as advertisers) know is the outstanding means of communication in this field.

C. E. GISCHEL, Sales Promotion Manager
Heli-Coil Corp.
Danbury, Conn.

Praise

Mr. Pastushin, president and general manager of Vic Pastushin's Industries, Inc., wants me to express his thanks for the fine article July 23 on the Demarest process. We both think Tom Self did a great job in ferreting out the facts and writing a most readable article.

NORMAN LYNN
Lynn-Western, Inc.
1418 North Highland Ave.
Los Angeles 28.

Saucers

So you'd like a little more discussion on flying saucers? Here's a curious situation:

On or about Jan. 16, this year, the directors of the Aero Club of New England, which happens to be the oldest organization of its kind in the country (founded Jan. 9, 1902) suggested to Air Force Secretary Finletter that "Project Saucer" ought to be resumed for reasons cited. (For instance, the Air Force's own statement that it couldn't account for some of the cases it investigated.) The reply from the Pentagon was that "Project Saucer" would stay closed.

Imagine our surprise at being informed immediately afterward by another Pentagon source (in writing over an official signature) that the Air Force hadn't discontinued the project at all. We were told: "Col. Harold E. Watson, chief of intelligence, Wright-Patterson Air Force Base, continues to be in charge of this project for the Air Materiel Command."

So one Air Force spokesman was saying the project was discontinued; another was saying it was still being carried on.

We feel that some highly reliable witnesses on various occasions have seen "aerial craft" which the Air Force has been unable to explain. On these, the Air Force just seemed to lose interest and weakly give up, after eliminating the balloons, pipe dreams and other unimportant reports.

ROBERT B. SIBLEY, President
Aero Club of New England

Anent your editorial on flying saucers: The Air University Periodical Index classifies them under "Illusions and Hallucinations." That is all.

WILLIAM G. KEY, Editor
The Pegasus
Fairchild Engine & Airplane Corp.
1625 Eye Street, N.W.
Washington 6, D. C.

I. B. M. Reprints

It was with a great deal of interest and pleasure that we read the article entitled "Mechanized Control Saves Money" (at United Air Lines) AVIATION WEEK Apr. 16.

We feel that the contents of this article would be of great assistance to our field organization and we request permission to reprint that article. We will, of course give full acknowledgment to AVIATION WEEK.

C. F. GRAF, Manager
Applications Development Department
International Business Machines Corp.
590 Madison Ave.
New York 22.

Providence Lost

By putting a strong reading glass on the drawing accompanying the story on the proposed Robinson-Wiggins merger in AVIATION WEEK June 11 I am able to come up with a small "beef." The artist appears to have moved Providence over into Massachusetts. Think what would happen if you moved Fort Worth into Oklahoma!

ROBERT M. HOWARD,
Assistant Administrator of Aeronautics,
Division of Aeronautics,
Hillsgrove, R. I.

Simulators

I want to compliment you for the fine job which George Christian did on the subject of Link flight simulators in your July 9 issue. This is a very specialized field, but Mr. Christian obtained a fine grasp of it during his visit in our plant.

T. E. MULFORD, Manager
Industrial & Public Relations
Link Aviation, Inc.
Hillcrest, Binghamton, N. Y.

(Editor Robert H. Wood, whose editorials usually appear on this page, is on vacation.)

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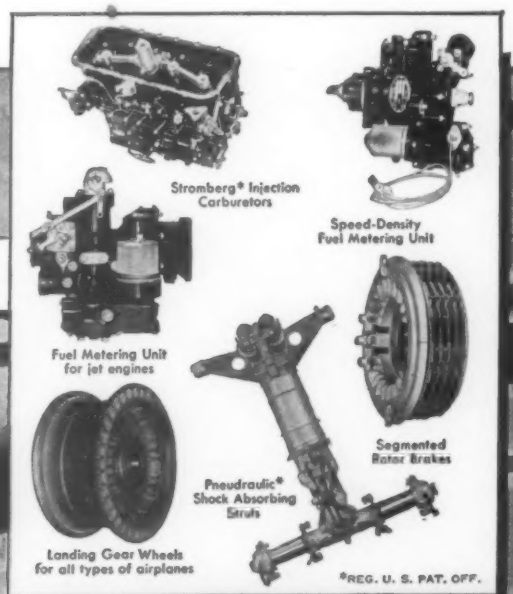
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